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Quietness in All Markets

Some Weakness in Sheets and Bars—Export Trade Falling Off

In point of new business both pig iron and finished material markets have been quieter in the past week than in any other since January. While there is little change in the scale of mill operations, it is evident that if it is to be long maintained the stream of new orders must increase. A feeling of disappointment is appearing, but against it is the fact that even the bare hand-to-mouth buying, which is now the rule, has some favorable surprises week by week. Moreover, the unfilled orders in the hands of the steel companies now represent actual business, much of it for early rolling, and therefore make a better comparison with the larger totals of other years than appears on the face of the statistics.

The railroads in particular give little promise of larger buying, and those who speak for them are discouraging anything but modest expectations on the part of the steel trade for the entire year.

Publications abroad concerning exports of sheet bars from the United States to England and Wales refer to such shipments as growing, whereas they have been smaller than at the same period last year. In January and February our total iron and steel exports averaged 150,000 tons, or 50 per cent. more than the monthly average for 1910, but foreign inquiry and orders have been falling off for several weeks.

The Harriman lines have placed 72,000 tons of rails which presumably cover only a part of the year's requirements. The Illinois Steel Company will furnish 21,225 tons of Bessemer rails, the Tennessee Company 18,000 tons of open hearth rails and the Colorado Company 33,000 tons of open hearth rails. The Brooklyn Rapid Transit Company has bought 2000 tons, the Boston Elevated 1800 tons and one of the Chicago terminal roads 2500 tons.

Structural contracts of the week include 2500 tons for the Gunther Building, Chicago; 3000 tons for the Trinity Corporation's printing building in New York, 1500 tons for an International Harvester Company machine shop in Milwaukee and 2000 tons of bridge work for a Western road. Bids have been taken on 7500 tons for the Insurance Exchange Building in New York, and bids close this week on 4000 tons for the Pennsylvania Hotel, Pittsburgh, and 2500 tons for the Gary Screw & Bolt Company's new plant at Gary, Ind. The extensive grade crossing work of the Pennsylvania Railroad in Cleveland will come upon the market in June.

A co-operative movement, only tentative as yet, is on foot in the fabricating trade, which has suffered severely from the extremely low prices, not only on large contracts, but on much of the ordinary steelwork let in recent months.

Weakness in iron bars is more pronounced in Eastern and Western markets. Refined iron bars have sold

at 1.35 cents, delivered in eastern Pennsylvania. There is some indication in the West that the steel bar market is not so firm.

Sheet manufacturers will meet this week to consider trade conditions. Prices on sheets have been less generally maintained of late.

Recent cutting on rivets has precipitated an open market. Boiler rivets have sold at 1.75 cents, Pittsburgh, or $5 a ton below what has been considered the regular basis.

For the Chilean warship contract three bids are reported from the United States, and the tonnage in armor and hull plates is put at 8000 tons.

A Toledo, Ohio, shipyard has taken a car ferry contract calling for 2500 tons of plates and shapes.

Low prices on ferromanganese for the second half of the year have brought out a good deal of business, some of which was done at $36.50, Baltimore.

The pig iron market goes on in the same rut, with buyers and sellers looking for light on the situation for the last half of the year, and finding little. Furnaces are getting less of an advance for that delivery than in early March. Southern iron has sold in a few cases below $11 for early delivery. The chief inquiry pending is from pipe works. The market for steel-making iron is at a standstill.

Lake Superior ore prices may be announced in the coming week. Furnace interests are by no means a unit in the view that last year's prices must be held as a prop to pig iron, and a reduction of 25 cents is now discussed as being not so radical as to shake the general market, while it takes some account of the change in conditions.

Our New Location

This week the David Williams Company, publisher of *The Iron Age*, the *Iron Age-Hardware*, the *Metal Worker, Plumber and Steam Fitter* and the *Building Age*, has effected the removal of its offices from 14 Park place to 239 West Thirty-ninth street, between Seventh and Eighth avenues, New York City. As might be expected, the removal of the extensive business of this company has not been accomplished without some confusion, and it is possible that a number of our friends may find their correspondence delayed during the course of the rearrangement of the various departments in the new quarters. The delay will simply be temporary, and it may be expected that in a very few days all the business of the company will be proceeding as smoothly as usual. We shall be glad to welcome visitors in our new location, which we trust will prove convenient to a larger number than the old quarters in the downtown section of the city.

The Readers of "The Iron Age"

Within the past few months W. H. Taylor, general manager of the David Williams publications, has addressed a letter to 5000 subscribers to *The Iron Age*, asking each to state specifically who reads the copy of the paper thus received. The replies have been most gratifying, and we here express our appreciation and thanks to the more than 3200 persons who took the pains to write us.

The fact that 64 per cent. of those addressed replied to this letter is a splendid evidence of the good will of our readers. The inquiry was not sent to selected firms or companies, but the first 5000 names on our subscription list were taken as being fairly representative of the whole circulation. But we will still welcome from any reader a letter offering suggestions for the improvement of *The Iron Age* and telling who reads his copy of the paper.

The letter of inquiry said that the information was sought with a view to making the paper more valuable, and many of our correspondents volunteered friendly criticism and suggestion. But the feature of the replies which is of most striking interest is the statistical exhibit they make possible, classifying the readers of *The Iron Age*. We find that the 3209 replies represent 10,386 readers, divided as follows:

Officers and managers	3,401
Purchasing agents	963
Superintendents and engineers	1,483
Foremen	604
Unlisted*	3,935

* Readers for whom no specific position was given in the reply. It is possible that a large number of such readers would properly be placed in the other classifications if complete information was available.

Assuming that the same proportion holds for the entire circulation of 12,000 copies, and no reason can be seen why it should not, the total readers of each issue of *The Iron Age* are found to be over 38,000, of whom nearly 13,000 are officers and managers, nearly 4000 purchasing agents, over 5000 superintendents and engineers and over 2000 foremen.

From this exhibit it is evident that, in the effort to make *The Iron Age* more valuable, weight must be given to the things of special interest to the officers and superintendents of the manufacturing plants in iron and steel and metal working lines. Readers among mechanics and other workmen are relatively few, and therefore negligible, in determining the character of reading matter. Even among the foremen, the readers as compared with superintendents and engineers are only in the ratio of about 1 to 2½, while the ratio of actual foremen to superintendents is, perhaps, more nearly 2½ to 1; that is, many of those reported as foremen who read *The Iron Age* are men fairly ranking as superintendents—the foremen in more responsible positions.

An important phase of this information, and one which will be put to good use, is its value to advertisers. For an advertiser to know exactly the class of buyers reading his announcements is to enable him to frame his argument to the best effect. To appeal to the general manager of an industrial plant calls for a very different advertisement from that used to attract the attention of a mechanic. We shall therefore give the widest publicity to the data our subscribers have furnished us, and the subscriber first and last will reap the benefit.

For more than half a century *The Iron Age* has enjoyed a unique reputation. Its present publishers came to the direction of its affairs 18 months ago with an appreciation of its prestige, but with no such realization of its great scope and power as the 3209 letters from our subscribers have brought. The character of the firms or companies, the positions occupied by the men signing the letters, and the interest so generally expressed in the publication are telling proof of the influence of *The Iron Age* in the metal industries of the country.

The publishers of this paper realize the responsibil-

ity of living up to such a reputation and of meeting such expectations. But with the continued co-operation of their readers, they dare to believe that the future holds even better things than have yet been attained.

Accident Compensation and Conciliation

It is to be deplored that the spirit of antagonism to employers, which some leaders of organized labor show on every occasion, should have entered into the discussion of the question of accident compensation. The hearings before the various State Commissions have developed no little feeling. In one or two cases members of these commissions who were regarded as representing organized labor have been bitterly assailed by the unions because they have been willing to accept certain compromises where the issue was sharply drawn between the interests of employers and employees.

The whole purpose of the movement in which employers have taken so active a part in the past few years is to get this question on a higher plane. As long as accident claims are contested on the strict basis of the law, the spirit of the pound of flesh may be expected on both sides. In the effort to introduce conciliation and to substitute humane and equitable settlements for the technicalities of legal conflicts, it would seem that both sides should approach the question without animosity. The history of litigated accident cases is well known. Whether employer or employee has lost in any particular case—and both have been heavy losers in the long catalogue of accident suits—there has always been one successful class—those whom employers and workmen have employed to fight for them. Not only does the present movement aim at conservation of life and limb, but at the saving of the large sums of money now expended in accident litigation with so grotesquely small result to the injured employee and his dependents. If a better way is to be found it must not be sought in antagonism, but in conciliation and mutual interest.

It is no time to attempt to recast the lines on which modern industry is conducted, nor to reverse at a stroke all the precedents and practice of centuries relating to accident liability. There will be abundant opportunity for amending the legislation that will result from the present agitation in the various States. And it must not be forgotten that the courts are still here and that nothing can come of attempts to wrest away common law or statute rights. The whole strength of the new plans that are taking shape in some of the States lies in the willingness of employers and employees to adopt them. They must find reasons in their mutual interest for electing them, and all the legislatures and all the labor unions cannot take away this power of choice.

Awakening to the Danger of Fire

The recent appalling fire in a New York City shirtwaist factory, involving the loss of 144 lives, is causing manufacturers throughout the country to examine more carefully the precautions against fire in their own establishments. Many of them find that subordinates intrusted with the duty of looking after such details have permitted the apparatus to get out of order. Fire pails have been discovered empty, their contents having evaporated; extinguishers have been permitted to become so old that their efficiency may well be doubted; fire doors intended to be closed except when actually in use are found open, even at night, and inflammable rubbish has been permitted to accumulate in dangerous places. Long immunity from fire in any establishment is apt to make everybody in authority somewhat lax in guarding against it and in enforcing even the most ordinary precautions. It is deplorable that something really serious is required to awaken responsibility or vigilance. A neighborhood fire involving great destruction of property may do it to some extent, but one which is accompanied by the loss of many human lives is a much greater stimulant to the energetic overhauling of precautionary arrangements. It is to be hoped that the recollection of this great catastrophe may be influential for more than a brief season.

A Notable Anniversary

The celebration at Boston this week of the semicentennial of the charter of the Massachusetts Institute of Technology signalizes the large contribution of this school to the country's industrial advance. Iron and steel manufacture and the working of metals are fields in which a vast amount of good work has been done by the alumni of this excellent institution, and representatives of these industries have done much for the programme of the week's congress. The half century has brought a development in industry, not only in the United States but throughout the world, well nigh equaling that of all the centuries preceding. It has been a period in which "applied science" has come to be vastly significant in industrial operations, and the technically trained man has become a commanding factor in commerce and manufacture. It is true that the view is now and then expressed that the supply of engineers is increasing more rapidly than the ability of mining, metallurgical and mechanical industries to absorb such talent. But the conditions which have been emphasized in the familiar discussion of that question only mean that the standards are rising and that what was an extraordinary equipment 25 years ago is much nearer the average to-day.

It is of particular significance that the celebration at Boston comes at a time when the field of applied science, once regarded as limited to the drafting room or the laboratory, is being extended to industrial management. The direction of productive forces, formerly treated as a natural gift, depending little on training, is now recognized as a thing to be acquired, as other equipment for an industrial career is acquired. It is more than a coincidence that so much prominence is given in the papers read at the congress of the Massachusetts Institute to works administration and scientific management. It indicates that while many of the alumni of the institution have won distinction in developing mines, in building and operating railroads, in producing and distributing power, and in the practical applications of chemistry and metallurgy, others have made good contributions to the standardizing of modern factory practice. In the development of higher efficiency in production, the value of scientific investigation has been emphasized recently as never before, and the trained man has taken a new place of prominence in shop management. The papers prepared for the Boston congress, some of which are reproduced in

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this issue, while others will follow, are in themselves an impressive exhibit of the equipment the technically trained mind brings to the solution of modern shop problems.

Workmen Appreciate Technical Publications

Those manufacturing establishments which maintain libraries of technical publications for the use of their employees have found the expenditure a profitable one. The men use the libraries for the most part during the noon hour, but frequently, where the closing time permits, remain to take advantage of the opportunity offered. The technical journals are chiefly sought. The public libraries are regularly visited for the same purpose by many workmen and foremen, and men higher in authority are occasionally found there. The librarians state that the use of this class of current literature is much greater than a decade ago, men realizing to a higher degree the value to their future of keeping in touch with current engineering conditions and improvements.

Correspondence

Labor Speeding Under Scientific Management

To the Editor: The figures quoted by Frederick W. Taylor from his new book on "The Principles of Scientific Management" indicate the theoretic possibility of one man loading from the ground 47½ long tons of pig iron, in 92-lb. pigs, in a working day of 10 hours. Yet I doubt the physical possibility that any man or set of men could continue to work for three years, at the pace rendered necessary by the figures quoted.

According to them, it takes a man only 13 2-5 sec. of time to pick up a pig, carry it up an inclined plank, and deposit it on a car—the average length of such walk being 36 ft. Allowing half of this time for the return, would make the total about 20 sec. for each pig, or 3 pigs per minute. At this rate the 1156 pigs would be loaded in 386 min. In the example given by Mr. Taylor, in his article from which I quoted in my letter published in your issue of April 6, the job was finished in 9½ hours, or 570 min. Subtracting 386 from above would leave for rest periods 184 min. Mr. Taylor has not yet given the length of these periods, but states that they were generally taken sitting down after loading 10 to 20 pigs. Taking 15 pigs as the average, there would be 77 such periods during the loading, and 2½ min. to each period does not seem to be an extravagant estimate for such rests, or 192 min. for all. Of course, I may have overestimated the rest periods, but, considering what the loader has to do, my estimate does not seem out of the way, and I have been assured by doctors to whom I have submitted this matter that they do not think it physically possible for any man to continue working at this pace for any length of time without heart failure.

This brings up the humanitarian side of the question, as well as the economic. Does it pay employers to require their men to walk 16 miles per day ("these men walked about 8 miles under the load each day and 8 miles free from load"), carrying for 8 miles, partly up hill, "106,400 lb. of pig iron," in order to earn $1.85 per day, rather than one quarter of the amount at $1.15 per day? Does it pay the men to do 400 per cent. more work for 60 per cent. more pay? Does not such "speeding" as this make the objection which the labor unions have to such methods both plausible and necessary? To ask these questions seems to me to answer them, and, while they may not enter into the calculations of the "scientific manager," yet from what I know of the manufacturers of this country, as a body, they are not so inhuman as to require that their workmen shall risk their health and their lives in doing such "stunts" as Mr. Taylor mentions.

ROBERT MATHEWS.

ROCHESTER, N. Y.

The Newark Foundrymen's Association

The April meeting of the Newark Foundrymen's Association, Newark, N. J., was held at the Washington, on the evening of April 5. After dinner the election of officers took place, returning the old officers to another term as follows: Franklin Phillips, president; James Flockhart, vice-president; Arthur E. Barlow, secretary, and G. Hannay, treasurer. An interesting talk on the "Government Method of Testing Government Metal" was given by W. S. Prince, of Henry R. Worthington, Inc. Figures showing a variation of 20,000 lb. tensile strength and 9 per cent. of the elongation in tests on bars poured from the same melt were given. He believes that the method now pursued by the Government inspectors, requiring a test bar to be attached to the casting, is faulty, inasmuch as it does not show the quality of the metal in the cast as the figures given proved. The next meeting of the association will be held May 4, and a lecture illustrated by stereopticon views on "Core Binders and Core Sands" will be given by H. M. Lane, editor of *Castings*. The association has invited nearby foundrymen and supply dealers, not now connected with the association, to this meeting.

The Machine Tool Builders' Convention

The programme of the spring meeting of the National Machine Tool Builders' Association, at the Marlborough-Blenheim, Atlantic City, May 18 and 19, is practically completed. The opening session, Thursday morning, will be given up to committee reports, and the afternoon to the meetings of the various committees representing the different divisions of the industry. On Friday the papers and topics of discussion will be as follows:

"Department Plan of Machine Tool Arrangement on the Basis of Equipment," by F. C. Kent, superintendent Pierce-Great Arrow Company, Buffalo, N. Y.

"Department Plan of Machine Tool Arrangement on the Basis of Product," by a speaker to be announced.

Open discussion period of 20 minutes.

"The Scientific Development of Shop Efficiency," by F. W. Taylor, general manager Tabor Mfg. Company, Philadelphia.

"The Proper Distribution of Expense Burden," by A. Hamilton Church, certified accountant, Boston.

Open discussion period of 15 minutes.

"Employers' Liability and Workmen's Compensation," by F. C. Schwedtman, chairman Industrial Association of St. Louis, and James A. Emery, counsel National Association of Manufacturers, Washington, D. C.

Reports of convention committees.

March Copper Production and Stocks

The Copper Producers' Association has issued its monthly statement for March as follows:

	Pounds.
Stock of marketable copper of all kinds on hand at all points in the United States March 1	156,637,770
Production of marketable copper in the United States from all domestic and foreign sources during March	130,532,080
Deliveries of marketable copper during March:	
For domestic consumption	66,080,789
For export	59,081,127
Total	125,161,916
Stock of marketable copper of all kinds on hand at all points in the United States April 1	162,007,934

These figures show an increase in stocks from March 1 to April 1 of 5,370,164 lb., which is a considerably smaller increase than had been expected. This is the more striking in view of the fact that for the first time the refinery production for any one month exceeded 130,000,000 lb. In 1910 there were two months when the output exceeded 127,000,000 lb., while the high mark in 1909 was 124,000,000 lb.

Vol. I., No. 1, of the *Steel and Metal Digest*, being the April number of a new publication by the American Metal Market Company, New York, is in pamphlet form, and contains 36 pages, 6 x 9 in. The purpose of the journal is to give a summary of events in the metal, iron and steel markets month by month, with tables of prices and other statistics relating to these trades.

Philadelphia Pig Iron Prices for 10 Years

So many requests have been received for pig iron prices for a series of years at Philadelphia, Pa., and vicinity that August A. Miller, editorial representative of *The Iron Age* in that city, has compiled the subjoined 10-year tables, which are averaged from the weekly quotations published in our market reports, and has also plotted from these tables the diagram given herewith:

Average Prices Standard Brands Eastern Pennsylvania No. 2 X Foundry Iron.

	1901.	1902.	1903.	1904.	1905.	1906.	1907.	1908.	1909.	1910.
January...	$15.50	$16.75	$22.45	$14.69	$17.50	$18.50	$24.80	$18.25	$17.25	$19.00
February..	15.31	17.19	22.25	14.50	17.50	18.50	25.87	18.25	17.00	18.69
March.....	15.12	18.81	22.25	14.80	17.56	18.35	25.00	18.12	16.37	18.00
April.....	15.46	19.62	21.87	15.00	17.75	18.44	24.81	17.65	16.20	17.75
May.....	15.19	19.75	20.06	14.75	17.81	18.50	25.55	16.94	16.06	17.00
June.....	15.06	20.94	19.19	14.50	16.75	18.44	24.62	16.62	16.42	16.55
July.....	15.00	22.30	18.10	14.31	16.12	18.25	23.06	16.50	16.50	16.25
August....	14.97	22.00	16.87	14.25	16.25	19.00	21.90	16.50	17.09	16.00
September.	14.80	22.00	16.12	14.25	16.43	20.44	20.50	16.62	18.05	16.00
October...	15.25	22.12	15.20	14.43	17.25	21.12	19.85	16.75	18.69	15.81
November.	15.37	23.37	15.00	15.75	18.05	23.30	18.94	17.00	19.60	15.68
December..	15.75	23.00	15.00	16.90	18.25	24.00	18.84	17.25	19.00	15.50

Average Prices Standard Brands Basic Iron.

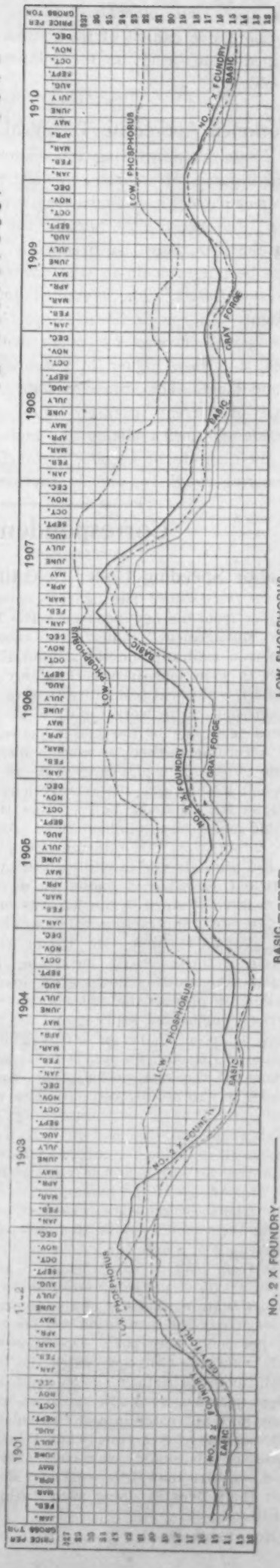
	1901.	1902.	1903.	1904.	1905.	1906.	1907.	1908.	1909.	1910.
January...	$14.00	$15.87	....	$13.75	$16.50	$17.85	$23.87	$17.04	$16.75	$18.75
February..	13.94	17.25	$20.00	13.70	16.50	17.97	24.37	17.25	16.56	18.50
March....	14.00	18.25	20.00	13.78	16.69	17.82	24.44	17.25	15.50	17.88
April.....	14.50	19.00	19.81	14.00	16.75	17.86	24.00	17.25	15.00	17.50
May.....	14.29	19.00	19.25	13.81	16.53	17.59	24.65	16.25	15.00	16.70
June.....	14.19	19.50	18.75	13.53	16.00	17.75	23.94	15.50	15.50	16.10
July.....	14.00	20.70	17.75	13.04	15.00	17.82	22.33	15.10	15.80	15.70
August....	14.00	20.50	16.00	12.81	15.25	17.96	20.65	15.00	16.87	15.20
September.	14.00	20.50	15.12	12.73	15.81	21.15	19.08	15.25	18.00	15.05
October...	14.00	20.50	14.50	13.18	17.08	18.58	18.40	15.50	18.83	15.00
November.	14.19	20.50	14.06	15.75	17.55	19.56	17.81	16.25	18.62	14.95
December..	14.62	20.50	13.79	14.56	17.81	22.75	17.33	16.70	18.75	15.00

Average Prices Standard Brands Gray Forge Iron.

	1901.	1902.	1903.	1904.	1905.	1906.	1907.	1908.	1909.	1910.
January...	$14.50	$15.87	$20.50	$13.50	$16.00	$17.00	$22.37	$16.45	$16.06	$17.75
February..	14.19	16.62	20.00	13.50	15.62	16.62	22.50	16.50	16.00	17.50
March....	14.00	17.62	19.50	13.50	16.00	16.50	23.00	16.50	15.44	16.90
April.....	14.37	18.19	19.12	13.75	16.00	16.50	22.62	16.15	14.95	16.62
May.....	14.39	18.35	18.62	13.56	15.75	16.50	22.70	15.44	14.81	15.94
June.....	14.06	18.94	17.87	13.35	15.20	16.16	22.56	15.12	15.18	15.65
July.....	13.50	20.30	17.50	13.12	14.62	16.19	21.69	15.00	15.35	15.37
August....	13.75	20.50	15.81	13.00	14.75	17.15	19.20	15.00	15.94	15.00
September.	13.75	20.00	14.94	12.90	14.81	17.75	18.50	15.37	16.85	14.75
October...	13.75	19.75	14.05	13.19	15.69	18.42	17.85	15.50	17.50	14.69
November.	13.94	21.00	13.75	14.56	16.25	20.70	16.75	15.62	17.75	14.69
December..	14.44	21.00	13.75	15.90	16.25	21.75	16.50	15.85	17.75	14.65

Average Prices Standard Brands Low Phosphorus Iron.

	1902.	1903.	1904.	1905.	1906.	1907.	1908	1909.	1910.
January...	....	....	....	$20.00	$24.33	$27.19	$24.60	$21.50	$22.81
February..	....	$21.37	....	20.00	24.50	26.62	24.00	21.50	22.94
March....	....	21.31	....	20.06	25.00	27.00	23.62	21.37	23.00
April.....	....	21.25	....	20.56	24.75	27.00	23.40	20.70	23.00
May.....	....	20.99	....	20.56	24.70	27.45	21.50	19.56	23.00
June.....	$22.50	20.85	....	20.56	24.50	27.69	21.00	19.50	22.90
July.....	23.00	....	$17.75	20.25	24.50	27.69	21.00	19.50	22.56
August....	23.00	....	17.50	20.45	24.50	27.60	20.87	20.25	22.50
September.	23.37	21.33	17.50	20.56	24.69	27.50	20.25	21.00	22.50
October...	22.70	21.00	18.06	21.75	25.44	27.05	20.00	22.25	22.50
November.	....	....	19.56	23.50	26.45	25.75	20.62	22.75	22.50
December..	21.50	20.00	19.90	24.00	27.25	25.00	21.40	22.75	22.50



Fluctuations in Standard Brands of Eastern Pennsylvania No. 2 X Foundry, Basic, Low Phosphorus and Gray Forge Pig Iron, Per Gross Ton, at Philadelphia, Pa., Compiled by August A. Miller.

The Scottdale Foundry & Machine Company, Scottdale, Pa., manufacturer of rolling mill machinery, recently furnished a large mill table embodying some special features to the Superior Steel Company, Carnegie, Pa.

The Andrews & Hitchcock Iron Company contemplated blowing in one of its furnaces this week, but has decided to allow it to remain out of blast for the present at least.

The Joliette Steel & Iron Foundry Company, Joliette, Quebec, Canada, recently installed a 2500-lb. Baillot converter. Steel castings were first made on March 1.

The Orton & Steinbrenner Company, Chicago, has appointed W. Van R. Whitall, Inc., 30 Church street, New York City, as New York and New England representative for its locomotive cranes and grab buckets.

The fortieth annual convention of the National Association of Stove Manufacturers will be held at the Hotel Astor, New York, Thursday and Friday, May 11 and 12.

The Iron and Metal Markets

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics.

At date, one week, one month and one year previous.

	Apr. 12, 1911.	Apr. 5, 1911.	Mar. 8, 1911.	Apr. 13, 1910.
PIG IRON, Per Gross Ton:				
Foundry No. 2, standard, Philadelphia	$15.50	$15.50	$15.50	$17.75
Foundry No. 2, Valley furnace	13.75	13.75	13.75	15.75
Foundry No. 2, Southern, Cincinnati	14.25	14.25	14.25	15.25
Foundry No. 2, Birmingham, Ala.	11.00	11.00	11.00	12.00
Foundry No. 2, local, Chicago	15.50	15.50	15.50	17.50
Basic, delivered, eastern Pa.	15.25	15.25	15.25	17.50
Basic, Valley furnace	13.75	13.75	13.75	16.00
Bessemer, Pittsburgh	15.90	15.90	15.90	18.40
Gray forge, Pittsburgh	14.40	14.40	14.40	16.15
Lake Superior charcoal, Chicago	17.50	17.50	17.50	19.00
COKE, CONNELLSVILLE, Per Net Ton, at oven:				
Furnace coke, prompt shipment	1.60	1.60	1.55	1.75
Furnace coke, future delivery	1.75	1.75	1.75	1.95
Foundry coke, prompt shipment	2.00	2.00	2.00	2.55
Foundry coke, future delivery	2.25	2.25	2.25	2.75
BILLETS, &c., Per Gross Ton:				
Bessemer billets, Pittsburgh	23.00	23.00	23.00	27.00
Forging billets, Pittsburgh	28.00	28.00	28.00	32.00
Open hearth billets, Philadelphia	25.40	25.40	25.40	30.60
Wire rods, Pittsburgh	29.00	29.00	29.00	33.00
OLD MATERIAL, Per Gross Ton:				
Iron rails, Chicago	14.50	14.50	15.50	18.50
Iron rails, Philadelphia	*17.50*	18.00	18.50	20.50
Car wheels, Chicago	13.25	13.25	13.25	16.50
Car wheels, Philadelphia	13.25	13.25	14.00	16.00
Heavy steel scrap, Pittsburgh	*13.25*	13.75	14.75	17.00
Heavy steel scrap, Chicago	11.50	11.50	12.00	14.50
Heavy steel scrap, Philadelphia	13.50	13.50	14.00	16.25
FINISHED IRON AND STEEL, Per Pound:	Cents.	Cents.	Cents.	Cents.
Bessemer steel rails, heavy, at mill	1.25	1.25	1.25	1.25
Refined iron bars, Philadelphia	1.37½	1.37½	1.37½	1.50
Common iron bars, Chicago	1.25	1.25	1.27½	1.55
Common iron bars, Pittsburgh	1.35	1.35	1.35	1.60
Steel bars, tidewater, New York	1.56	1.56	1.56	1.61
Steel bars, Pittsburgh	1.40	1.40	1.40	1.45
Tank plates, tidewater, New York	1.56	1.56	1.56	1.71
Tank plates, Pittsburgh	1.40	1.40	1.40	1.55
Beams, tidewater, New York	1.56	1.56	1.56	1.66
Beams, Pittsburgh	1.40	1.40	1.40	1.50
Angles, tidewater, New York	1.56	1.56	1.56	1.66
Angles, Pittsburgh	1.40	1.40	1.40	1.50
Skelp, grooved steel, Pittsburgh	1.30	1.30	1.30	1.50
Skelp, sheared steel, Pittsburgh	1.35	1.35	1.35	1.60
SHEETS, NAILS AND WIRE, Per Pound:	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, Pittsburgh	2.20	2.20	2.20	2.40
Wire nails, Pittsburgh*	1.80	1.80	1.80	1.85
Cut nails, Pittsburgh	1.70	1.70	1.60	1.85
Barb wire, galv., Pittsburgh*	2.10	2.10	2.10	2.15
METALS, Per Pound:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York	*12.37½*	12.50	12.62½	13.00
Electrolytic copper, New York	*12.12½*	12.25	12.25	12.87½
Spelter, New York	*5.50*	5.55	5.65	5.60
Spelter, St. Louis	*5.30*	5.35	5.50	5.45
Lead, New York	4.45	4.45	4.40	4.40
Lead, St. Louis	4.30	4.30	4.25	4.25
Tin, New York	42.25	41.75	41.75	32.45
Antimony, Hallett, New York	*9.00*	9.12½	9.25	8.25
Tin plate, 100-lb. box, New York	$3.94	$3.94	$3.94	$3.84

* These prices are for largest lots to jobbers.

Prices of Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16c.; Philadelphia, 15c.; Boston, 18c.; Buffalo, 11c.; Cleveland, 10c.; Cincinnati, 15c.; Indianapolis, 17c.; Chicago, 18c.; St. Paul, 32c.; St. Louis, 22½c.; New Orleans, 30c.; Birmingham, Ala., 45c. Rates to the Pacific Coast are 80c. on plates, structural shapes and sheets, No. 11 and heavier; 85c. on sheets, Nos. 12 to 16; 95c. on sheets, No. 16 and lighter; 65c. on wrought boiler tubes.

Structural Material.—I-beams and channels, 3 to 15 in., inclusive, 1.40c. to 1.45c., net; I-beams over 15 in., 1.50c. to 1.55c., net; H-beams over 8 in., 1.55c. to 1.60c.; angles, 3 to 6 in., inclusive, ¼ in. and up, 1.40c. to 1.45c., net; angles over 6 in., 1.50c. to 1.55c., net; angles, 3 in., on one or both legs, less than ¼ in. thick, 1.45c., plus full extras as per steel bar card effective September 1, 1909; tees, 3 in. and up, 1.45c., net; zees, 3 in. and up, 1.40c. to 1.45c., net; angles, channels and tees, under 3 in., 1.45c., base, plus full extras as per steel bar card of September 1, 1909; deck beams and bulb angles, 1.70c. to 1.75c., net; hand rail tees, 2.50c.; checkered and corrugated plates, 2.50c., net.

Plates.—Tank plates, ¼ in. thick, 6¼ in. up to 100 in. wide, 1.40c. to 1.45c., base. Following are stipulations prescribed by manufacturers, with extras to be added to base price (per pound) of plates:

Rectangular plates, tank steel or conforming to manufacturers' standard specifications for structural steel dated February 6, 1903, or equivalent, ¼-in. thick and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per square foot are considered ¼-in. plates. Plates over 72 in. wide must be ordered ¼-in. thick on edge, or not less than 11 lb. per square foot, to take base price. Plates over 72 in. wide ordered less than 11 lb. per square foot down to the weight of 3-16-in. take the price of 3-16-in.

Allowable overweight, whether plates are ordered to gauge or weight, to be governed by the standard specifications of the Association of American Steel Manufacturers.

Gauges under ¼-in. to and including 3-16-in. on thinnest edge	$0.10
Gauges under 3-16-in. to and including No. 8	.15
Gauges under No. 8 to and including No. 9	.25
Gauges under No. 9 to and including No. 10	.30
Gauges under No. 10 to and including No. 12	.40
Sketches (including all straight taper plates), 3 ft. and over in length	.10
Complete circles, 3 ft. in diameter and over	.20
Boiler and flange steel	.10
"A. B. M. A." and ordinary firebox steel	.20
Still bottom steel	.30
Marine steel	.40
Locomotive firebox steel	.50
Widths over 100 in. up to 110 in., inclusive	.05
Widths over 110 in. up to 115 in., inclusive	.10
Widths over 115 in. up to 120 in., inclusive	.15
Widths over 120 in. up to 125 in., inclusive	.25
Widths over 125 in. up to 130 in., inclusive	.50
Widths over 130 in	1.00
Cutting to lengths or diameters under 3 ft. to 2 ft., inclusive	.25
Cutting to lengths or diameters under 2 ft. to 1 ft., inclusive	.50
Cutting to lengths or diameters under 1 ft.	1.55

No charge for cutting rectangular plates to lengths 3 ft. and over.

TERMS.—Net cash 30 days.

Sheets.—Makers' prices for mill shipments on sheets in carload and larger lots, on which jobbers charge the usual discounts for small lots from store, are as follows: Blue annealed sheets, Nos. 3 to 8, U. S. standard gauge, 1.55c.; Nos. 9 and 10, 1.65c.; Nos. 11 and 12, 1.70c.; Nos. 13 and 14, 1.75c.; Nos. 15 and 16, 1.85c. One pass, cold rolled, box annealed sheets, Nos. 10 to 12, 1.85c.; Nos. 13 and 14, 1.90c.; Nos. 15 and 16, 1.95c.; Nos. 17 to 21, 2c.; Nos. 22, 23 and 24, 2.05c.; Nos. 25 and 26, 2.10c.; No. 27, 2.15c.; No. 28, 2.20c.; No. 29, 2.25c.; No. 30, 2.35c. Three pass, cold rolled sheets, box annealed, are as follows: Nos. 15 and 16, 2.05c.; Nos. 17 to 21, 2.10c.; Nos. 22 to 24, 2.15c.; Nos. 25 and 26, 2.20c.; No. 27, 2.25c.; No. 28, 2.30c.; No. 29, 2.35c.; No. 30, 2.45c. Galvanized sheets, Nos. 10 and 11, black sheet gauge, 2.20c.; Nos. 12, 13 and 14, 2.30c.; Nos. 15, 16 and 17, 2.45c.; Nos. 18 to 22, 2.60c.; Nos. 23 and 24, 2.70c.; Nos. 25 and 26, 2.90c.; No. 27, 3.05c.; No. 28, 3.20c.; No. 29, 3.30c.; No. 30, 3.50c. Painted roofing sheets, No. 28, $1.55 per square. Galvanized sheets, No. 28, $2.75 per square for 2½-in. corrugations. All above prices are f.o.b. Pittsburgh, terms 30 days net, or 2 per cent. cash discount 10 days from date of invoice.

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card on wrought pipe, in effect from October 1:

	Steel. Black.	Steel. Galv.	Iron. Black.	Iron. Galv.
Butt Weld.				
1 to 1½ in.	..	..	49	43
⅛ in.	75	63	71	59
¼ to 1½ in.	79	69	75	65
2 to 3 in.	80	70	76	66
Lap Weld.				
2 in.	76	66	72	62
2½ to 4 in.	78	68	74	64
4½ to 6 in.	77	67	73	63
7 to 12 in.	75	59	71	55
13 to 15 in.	51½	..	..	..
Butt Weld, extra strong, plain ends, card weight.				
⅛, ¼, ⅜ in.	69	59	65	55
½ in.	74	68	70	64
¾ to 1½ in.	78	72	74	68
2 to 3 in.	79	73	75	69
Lap Weld, extra strong, plain ends, card weight.				
2 in.	75	69	71	65
2½ to 4 in.	77	71	73	67
4½ to 6 in.	76	70	72	66
7 to 8 in.	69	59	65	55
9 to 12 in.	64	54	60	50
Butt Weld, double extra strong, plain ends, card weight.				
¼ in.	64	58	60	54
¾ to 1½ in.	67	61	63	57
2 to 3 in.	69	63	65	59
Lap Weld, double extra strong, plain ends, card weight.				
2 in.	65	59	61	55
2½ to 4 in.	67	61	63	57
4½ to 6 in.	66	60	62	56
7 to 8 in.	59	49	55	45

THE IRON AND METAL MARKETS

Plugged and Reamed.

1 to 1½, 2 to 3 in...Butt Weld } Will be sold at two (2) points lower basing (higher price) than merchant or card weight pipe, Butt or Lap Weld as specified.

2, 2½ to 4 in.....Lap Weld }

The above discounts are for "card weight," subject to the usual variation of 5 per cent. Prices for less than carloads are three (3) points lower basing (higher price) than the above discounts.

Boiler Tubes.—Discounts on lap welded steel and charcoal iron boiler tubes to jobbers in carloads are as follows:

	Steel.	Iron.
1 to 1½ in.	49	43
1¾ to 2¼ in.	61	43
2½ in.	63	48
2¾ to 3 in.	69	55

2½ in. and smaller, over 18 ft., 10 per cent. net extra.
2¾ in. and larger, over 22 ft., 10 per cent. net extra.

Less than carloads to destinations east of the Mississippi River will be sold at delivered discounts for carloads lowered by two points, for lengths 22 ft. and under; longer lengths, f.o.b. Pittsburgh.

Wire Rods and Wire.—Bessemer, open hearth and chain rods, $29 to $30 per gross ton. Fence wire, Nos. 0 to 9 per 100 lb., terms 60 days, or 2 per cent. discount in 10 days, carload lots, to jobbers, annealed $1.60, galvanized $1.90; carload lots, to retailers, annealed $1.65, galvanized $1.95. Galvanized barb wire, to jobbers, $2.10; painted, $1.80. Wire nails, to jobbers, $1.80.

The following table gives the prices to retail merchants on wire in less than carloads, including the extras on Nos. 10 to 16, which are added to the base price:

Fence Wire, Per 100 Lb.

Nos.	0 to 9	10	11	12&12½	13	14	15	16
Annealed	$1.75	1.80	1.85	1.90	2.00	2.10	2.20	2.30
Galvanized	2.05	2.10	2.15	2.20	2.30	2.40	2.80	2.90

Market and Stone Wire in Bundles, Discount from Standard List.

Bright and Annealed:
9 and coarser....80
10 to 18....80 and 10
19 to 26....80 and 10 and 2½
27 to 36....80 and 5
Galvanized:
9 and coarser....75 and 10
10 to 16....75 and 10
17 to 26....72½ and 10
27 to 36....72½
Coppered or Liquor Finished:
9 and coarser....75 and 10
10 to 26....75 and 10
27 to 36....70 and 10 and 5
Tinned:
6 to 18....75 and 10 and 10

Steel Rivets.—Structural rivets, ¾ in. and larger, 1.90c., base; cone head boiler rivets, ¾ in. and larger, 2c., base; ⅝ in. and 11-16 in. take an advance of 15c., and ½ in. and 9-16 in. take an advance of 50c.; in lengths shorter than 1 in. also take an advance of 50c. Terms are 30 days, net cash, f.o.b. mill.

Pittsburgh

PARK BUILDING, April 12, 1911.—(*By Telegraph.*)

Pig Iron.—There is some small buying of foundry and malleable Bessemer iron, but standard Bessemer, basic and gray forge are very dull, with practically no new inquiry. The Valley furnaces continue to hold the price of Bessemer at $15, at furnace, but have not made a sale in some weeks. Two blast furnaces which were scheduled to go in this week will remain out on account of the poor demand for pig iron. No large inquiries of any kind are in the market. We quote Bessemer pig iron, $15; malleable Bessemer, $13.75; basic, $13.75 to $14; No. 2 foundry, $13.75 to $14, and gray forge, $13.50, all at Valley furnace, the freight rate to the Pittsburgh district being 90c. a ton.

Steel.—A little cutting in the prices of billets and sheet bars has appeared, some of the smaller open hearth plants offering both billets and sheet bars at 50c. to $1 a ton under the regular price. The new demand from consumers is quiet, but specifications against contracts are coming in at a moderately good rate, although not as heavy as some time ago. The larger steel mills, that make both Bessemer and open hearth, are stated to be holding firmly to regular prices, which are as follows: Bessemer and open hearth billets, 4 x 4 in. and up to, but not including, 10 x 10 in., at $23, base, and sheet and tin bars in 30-ft. lengths, $24, f.o.b. Pittsburgh or Youngstown, full freight to destination added. We quote 1½-in. billets at $24, and forging billets at $28, base, usual extras for sizes and carbons, f.o.b. Pittsburgh or Youngstown districts, freight to destination added.

(*By Mail.*)

The iron trade continues in an uncertain and halting condition. The railroads seem to have retired from the market altogether. The Pennsylvania Lines West issued instructions last week canceling all orders on which shipments have not been made, or which have not been rolled. The pig iron market is practically lifeless. Cutting is being done in prices of open hearth steel by some of the smaller mills, and in the last few days both Bessemer and open hearth billets have been offered by dealers in small lots somewhat under the market. The demand for finished iron and steel is quiet, but prices are fairly strong. The coke trade is dull and scrap has declined materially in the past week. There is now a disposition by producers of both raw and finished materials to sell ahead for the entire year at present prices, but so far very little business has been offered by consumers. Some tin plate has been sold for fourth quarter delivery at to-day's market, and it is likely more sales will be made before the week is out.

Ferromanganese.—The very low prices ruling on foreign ferromanganese have stirred up consumers, and a good deal of material has been sold in the past week. One local consumer has bought 1000 tons, deliveries 250 tons a month commencing June, at $36.50, Baltimore; another interest has bought 200 tons at about $36.75, Baltimore, and a Kentucky steel interest is reported to have bought 500 tons for forward delivery at about $37, Baltimore. We quote 80 per cent. foreign at $36.50 to $36.75 in large lots and $37, Baltimore, in small lots, the rate for delivery to the Pittsburgh district being $1.95 a ton.

Ferrosilicon.—In spite of the low prices ruling on this material, there is very little new inquiry, most consumers being covered for some time ahead. We quote 50 per cent. at $53 to $53.50, f.o.b. Pittsburgh, for delivery through the third quarter; 10 per cent. blast furnace silicon, $23; 11 per cent., $24, and 12 per cent., $25, f.o.b. cars, Jisco and Ashland furnaces.

Muck Bar.—In the absence of sales, we continue to quote best grades of muck bar made from all pig iron at about $29, delivered at buyer's mill in the Pittsburgh district.

Skelp.—New inquiry is light, and in some cases consumers that have contracts with the mills are holding up shipments. Prices are fairly strong and we quote grooved steel skelp at 1.30c.; sheared steel skelp, 1.35c.; grooved iron skelp, 1.60c. to 1.65c., and sheared iron skelp, 1.70c. to 1.75c., all for delivery at consumers' mills in the Pittsburgh district, usual terms.

Wire Rods.—While most consumers are covered for some time ahead, they are not freely specifying against their contracts. New inquiry is dull. We quote Bessemer open hearth and chain rods at $29, Pittsburgh.

Steel Rails.—In the past week the Carnegie Steel Company has received orders for upward of 10,000 tons of standard sections for export, about half of which is to go to Japan. Two or three large inquiries for standard rails are in the market, but even if these are placed it is not likely that much of the business will come to the local interest. New orders and specifications for light rails in the past week were fairly good, the Carnegie Steel Company having taken about 3500 tons. The Edgar Thomson rail mills are operating to about 50 per cent. of capacity or less. Prices on light rails are as follows: 12-lb. rails, 1.25c.; 16, 20 and 25 lb., 1.21c. to 1.25c.; 30 and 35 lb., 1.20c., and 40 and 45 lb., 1.16c. The prices are f.o.b. at mill, plus freight, and are the minimum of the market on carload lots, small lots being sold at a little higher price. Standard sections are held at 1.25c. per pound.

Structural Material.—New inquiries are not very heavy and reports are that fabricated work is going at the lowest prices reached in some months, in spite of the fact that the mills claim to be holding firmly for beams and channels on the basis of 1.40c., Pittsburgh. The McClintic-Marshall Construction Company has taken about 1500 tons for the new Milwaukee machine shops for the International Harvester Company, and also about 2000 tons of bridge work for one of the Western roads. The American Bridge Company has taken 400 tons for a new smelting plant in Nevada.

Plates.—The Pennsylvania Railroad has divided about 6000 tons of plates and shapes for new cars that it will build at its Altoona shops between the Cambria Steel Company and the Carnegie Steel Company. All the plate mills are badly in need of orders, and none is operating to more than 60 to 75 per cent. of capacity, if that much. The Allegheny Steel Company, however, is running its plate mill at Brackenridge, Pa., to nearly full time this week, with a fair amount of work ahead. We quote ¼-in. and heavier plates at 1.40c., Pittsburgh.

Tin Plate.—Specifications against contracts are not so heavy as they were, but it is believed that in the latter half of the month they will be better, as already several large consumers have ordered the tin plate they will want for June shipment. The fact that several mills have made sales on the $3.70 basis for fourth quarter delivery has

THE IRON AND METAL MARKETS

stirred up the market to no little extent. The Monessen plant of the American Sheet & Tin Plate Company, containing 25 hot mills, will run only four days this week, and probably at the same rate next week. The leading interest is operating this week to about 80 per cent. of capacity, a slight falling off. The independent mills, especially those that make roofing plate, are running to nearly full capacity. The new demand is much under what it has been. We quote 100-lb. coke plates at $3.70 per base box, Pittsburgh.

Sheets.—It is likely that a meeting of the leading sheet mills will be held in Pittsburgh this week for the purpose of considering trade conditions. More disposition has been shown by some makers to go after new business aggressively, allowing slight concessions in prices to get it. This cutting in prices has not yet been severely felt, and after the situation has been gone over it is hoped that it will largely disappear. New orders for sheets have shown slight betterment, and specifications against contracts are reported as coming in a little more freely. Regular prices on the different grades of sheets are printed on a previous page.

Bars.—The demand for both iron and steel bars is reported to be quieter than at any previous time this year. Specifications against contracts are not coming in freely, and the whole situation is rather unsatisfactory. The decline in prices of scrap is reflected in iron bars, which are not as firm as they were, and there are also reports that prices of steel bars have been shaded in some cases, but these have not been verified. We quote steel bars at 1.40c. and common iron bars at 1.35c., Pittsburgh.

Shafting.—Specifications against contracts from the automobile builders and the implement makers are reported as coming in a little better, but new demand is quiet. Regular discounts of 57 per cent. off in carloads and 52 per cent. in less than carload delivered in base territory are sometimes shaded on desirable orders.

Spelter.—Prices are slightly firmer than they were last week, although new demand is very dull. We quote prime grades of Western at 5.35c., East St. Louis, equal to 5.42½c., Pittsburgh.

Hoops and Bands.—From some sections of the country specifications against contracts are coming in quite freely, but in some other sections are light or held up entirely. The new demand is only for small lots. We quote steel hoops at 1.45c. and bands at 1.40c., extras applying on the latter as in the present steel bar card.

Merchant Steel.—So far this month the new demand has been lagging and specifications against contracts have shown a falling off as compared with the same period in March. We quote the higher grades of merchant steels, f.o.b. Pittsburgh, as follows: Iron finished tire, ½ x 1½ in. and heavier, 1.40c., base; under these sizes, 1.55c.; planished tire, 1.60c.; channel tire, 1.80c., base; toe calk, 1.90c.; flat sleigh shoe, 1.55c.; concave or convex, 1.75c.; cutter shoes, tapered or bent, 2.25c.; spring steel, 2c.; machinery steel, smooth finish, 1.90c.

Rivets.—Specifications against contracts have not been coming in at a satisfactory rate for some time, and the new demand is confined to small lots. Regular prices of 1.90c. on structural rivets and 2c. on boiler rivets continue to be shaded on desirable orders.

Wire Products.—This branch of business does not seem to be affected by the adverse conditions generally existing in the iron trade. The consumption is enormously heavy, the wire mills operating to practically full capacity. The output of wire for fencing and other purposes this year promises to break all former records. Jobbers are specifying very freely against their contracts, and the retail trade is placing new orders actively. We quote galvanized barb wire at $2.10; painted, $1.80; annealed fence wire, $1.60; galvanized, $1.90; wire nails, $1.80, and cut nails, $1.70, f.o.b. Pittsburgh, full freight to destination added.

Spikes.—New orders so far this month have shown a falling off as compared with the latter part of March, but this is largely due to the fact that specifications were then rushed in to avoid the advance April 1. There are no large inquiries. Prices are now as follows:

Railroad Spikes

4½, 5 and 5½ x 9/16	$1.60
3, 3½, 4, 4½ and 5 x ½	Extra .10
3½, 4 and 4½ x 7/16	Extra .20
3, 3½, 4 and 4½ x ⅝	Extra .30
2½ x ⅝	Extra .40
2½, 3 and 3½ x 5/16	Extra .60
2 x 5/16	Extra .80

Boat Spikes.

¾ in. square, 12 to 24 in. long	Extra .15
⅝ in. square, 8 to 16 in. long	Extra .15
½ in. square, 6 to 16 in. long	Extra .15
7/16 in. square, 6 to 12 in. long	Extra .20
⅜ in. square, 4 to 12 in. long	Extra .30
5/16 in. square, 4 to 8 in. long	Extra .45
¼ in. square, 4 to 8 in. long	Extra .75
¼ in. square, 3 to 3½ in. long	Extra. 1.00

⅜ and 5/16 shorter than 4 in., ¼ cent extra.

Merchant Pipe.—It is reported that a Kansas City gas interest has placed an order for 10 miles of 6 to 8 in. line pipe, but as yet nothing has been done with the Los Angeles inquiry reported last week. The current demand for merchant pipe is fairly satisfactory. It is stated that regular discounts on both iron and steel pipe are being firmly held.

Boiler Tubes.—The new demand for boiler tubes is quiet, as most large consumers placed their contracts some time ago, specifications against which are coming in reasonably well. Prices on boiler tubes are more or less flexible, makers not adhering closely to the schedule.

Coke.—Inquiry for both furnace and foundry coke is light. Most of the blast furnace interests that buy their coke in the open market are covered for their supply for some time on sliding scale contracts, based on either Bessemer or basic iron. An inquiry from a Mahoning Valley blast furnace interest for 10,000 tons of coke per month that came in the market about a month ago has been withdrawn, the decision having been made not to blow in the furnace at present on account of the unsatisfactory condition of the pig iron trade. The output of coke in the Upper and Lower Connellsville regions last week was 368,029 net tons, a decrease over the previous week of a little more than 3000 tons. We quote standard makes of 72-hour foundry coke at about $2 for prompt shipment and $2.25 to $2.40 per net ton, at oven, for delivery over the remainder of the year. We quote standard makes of furnace coke for prompt shipment at $1.60 to $1.65, and for delivery over the next six months from $1.80 to $2 per net ton, at oven.

Iron and Steel Scrap.—The scrap market has shown a further decline in prices which have now about reached the low point that prevailed prior to February 15, when the upward turn took place. The local market on steel scrap is adversely affected by an embargo for scrap destined to Monessen, Pa., which was put on last week. The scrap list of the Pennsylvania Railroad closed Tuesday and the rail list, with 15,000 to 18,000 tons, closes Wednesday. The Baltimore & Ohio scrap list also closes Wednesday. The list of the Southern Railway closed Tuesday at Washington, D. C., containing about 3000 tons of scrap and 3000 tons of old car wheels. The new demand is dull, as most consumers are covered ahead. We note sales of 1000 tons of borings at about $9.10, delivered at consumer's mill, and 1000 tons of No. 2 heavy cast iron scrap at $13.25, delivered. Dealers are now quoting as follows, per gross ton, f.o.b. Pittsburgh, or elsewhere, as noted:

Heavy steel scrap, Steubenville, Follansbee, Sharon, Monessen and Pittsburgh delivery	$13.25 to $13.50
No. 1 foundry cast	13.75 to 14.00
No. 2 foundry cast	12.75 to 13.00
Bundled sheet scrap, at point of shipment	9.25 to 9.50
Rerolling rails, Newark and Cambridge, Ohio, and Cumberland, Md	14.50
No. 1 railroad malleable stock	12.50 to 12.75
Grate bars	10.50 to 10.75
Low phosphorus melting stock	16.75 to 17.00
Iron car axles	24.25 to 24.50
Steel car axles	18.50 to 18.75
Locomotive axles	23.00
No. 1 busheling scrap	12.50 to 12.75
No. 2 busheling scrap	9.00 to 9.25
Old car wheels	13.50 to 13.75
Sheet bar crop ends	15.50 to 15.75
*Cast iron borings	8.75 to 9.00
*Machine shop turnings	9.50 to 9.75
Old iron rails	16.00 to 16.25
No. 1 wrought scrap	14.25 to 14.50
Heavy steel axle turnings	10.25
Stove plate	10.50 to 10.75

* These prices are f.o.b. cars at consumers' mill in the Pittsburgh district.

Vivian, Bond & Co. have closed their offices here and retired from the Pittsburgh field. A. C. Daft, formerly connected with that firm, has opened an office in room 2502, Oliver Building, Pittsburgh, and will handle ferroalloys, pig iron and other products.

George C. Mills, formerly with Naylor & Co., has opened an office in room 1625, Farmers' Bank Building, Pittsburgh, and will handle pig iron, ferromanganese and ferrosilicon. He will also look after the interests of Naylor & Co. in the Pittsburgh district, that firm having abandoned its offices in the Frick Building March 15.

The offices of the Ohio Iron & Metal Company, iron and steel scrap, H. D. Stalnaker, resident manager, have been removed from rooms 2124-2125 to rooms 1123-1125, Farmers' Bank Building, Pittsburgh.

The Reinforced Brazing & Machine Company, Pittsburgh, has installed in its plant a new 55-hp. Miller engine, purchased from Wickes Brothers, Pittsburgh.

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Chicago

FISHER BUILDING, April 12, 1911.—(*By Telegraph.*)

The dullness of the past few weeks has extended into April, and the week under review has not even kept up to the sluggish activity of the first week in the month. In the pig iron market offers of Southern iron at $11, Birmingham, for the remainder of the year are reported to have called forward nothing more than scattering small orders. It is known that a considerable quantity of railroad equipment business is pending. The bar market has been very quiet, and some shading is reported. The price of scrap has been weak, and the tendency appears to be decidedly downward. The Atchison, Topeka & Santa Fe Railroad has issued one of the very largest scrap lists ever offered, but doubt is expressed as to the sale of this material on the present low market. Wire products and cast iron pipe continue active. General business conditions are somewhat below normal with no indication of immediate brightening.

Pig Iron.—The extreme dullness that dominated the pig iron market at the time of our last report has extended into this week, making it by far the most inactive period of the year. The only sales reported are small lots here and there which are too unimportant to mention. Foundries in this city report business a trifle better than for a few weeks past, but this is mostly work of a repair nature and there is no great volume in sight. Most foundries in this district have sufficient pig iron on hand to see them through the first half, and buyers are very evidently awaiting development of the present uncertain market before making known their future wants. An enormous accumulation of iron is known to exist at the furnaces, and this stock is not moving with any rapidity even under the stimulus of recent price concessions. The price of $11, Birmingham, for No. 2 Southern foundry, prevails in this market, and this figure is being freely quoted for the second and third quarters. It is felt that no great amount of pressure would be necessary to obtain the same price for business for the last half, although such a quotation it is felt would not bring forward many buyers in the present dull market. Northern furnaces are asking $1 advance on sales through the last half, but practically no deals are being closed. The general opinion is that this is not because prices are too high, but because of the lack of foundry business. The only encouraging feature of this week's market is that specifications against contracts have been somewhat freer. The following quotations are for April, May and June shipments, Chicago delivery:

Lake Superior charcoal	$17.50 to $18.00
Northern coke foundry, No. 1	16.00 to 16.50
Northern coke foundry, No. 2	15.50 to 16.00
Northern coke foundry, No. 3	15.25 to 15.75
Northern Scotch, No. 1	16.50 to 17.00
Southern coke, No. 1	15.85 to 16.35
Southern coke, No. 2	15.35 to 15.85
Southern coke, No. 3	15.10 to 15.60
Southern coke, No. 4	14.85 to 15.35
Southern coke, No. 1 soft	15.85 to 16.35
Southern coke, No. 2 soft	15.35 to 15.85
Southern gray forge	14.60 to 15.10
Southern mottled	14.60 to 15.10
Malleable Bessemer	15.50 to 16.00
Standard Bessemer	17.40 to 17.90
Jackson Co. and Kentucky silvery, 6%	17.90 to 18.40
Jackson Co. and Kentucky silvery, 8%	18.90 to 19.40
Jackson Co. and Kentucky silvery, 10%	19.90 to 20.40

(*By Mail.*)

Billets.—Little of interest has happened in the billet market. The quiet that seems to have settled over Western car industries is naturally reflecting a quietness in billets, the demand for which is almost absolutely dependent upon manufactories of this nature. The leading interest continues to maintain its price of $30.60, base, Chicago, on open hearth billets and $25.60, base, Chicago, on rerolling billets.

Rails and Track Supplies.—Specifications for rails and track supplies have somewhat fallen off, but increased activity is noted in inquiries that are coming into this market. Mills are running full on track supplies and the retrenchment policy in vogue does not seem to affect this branch of business. New construction may be avoided, and improvements of every kind curtailed, but the trackage now in use must be kept in good repair, and a certain amount of the lighter track supplies is constantly being used. Light rail business continues to be very active. Prices are firm, as follows: We quote standard railroad spikes at 1.70c. to 1.75c., base; track bolts with square nuts, 2.15c. to 2.25c., base, all in carload lots, Chicago. Standard section Bessemer rails, 1.28c.; open hearth, 1.34c. Light rails, 40 to 45 lb., 1.16c. to 1.20½c.; 30 to 35 lb., 1.19½ to 1.24c.; 16, 20 and 25 lb., 1.20½c. to 1.25c.; 12-lb., 1.25c. to 1.30½c., Chicago.

Structural Material.—The only sale of importance made in this section during the week was 2500 tons for the Gunther Building, which went to the Morava Construction Company. There was a time in this market when sales of this size caused considerable flurry among fabricators, but with the enormous increase in the capacity of fabricating plants that has come in the last few years jobs of this size are swallowed up with but passing comment. It is reported that plans for the Federal Life Building are about completed by the architects, Marshall & Fox. It is estimated that this building will require about 2000 tons of structural material. Railroad building is extremely quiet, and the lack of business is acting as a stimulant to those who rumor price concessions. We quote plain material from mill 1.58c. to 1.63c., Chicago; from store, 1.80c. to 1.90c., Chicago.

Plates.—There is considerable inquiry in this market for new cars and considerable railroad activity is expected to develop in the construction of rolling stock in the near future. No new business of note has been closed this week, and mills continue to run at about 60 per cent. capacity. We quote mill prices 1.58c. to 1.63c.; store prices, 1.80c. to 1.90c., Chicago.

Sheets.—Mills are running at about two-thirds capacity with but a comparatively small tonnage in sight. The sheet business so far this year has been below normal, and there is nothing in sight that would indicate a decided improvement. There is no change in Chicago prices, which are being well maintained as follows: Carload lots, from mill: No. 28 black sheets, 2.38c.; No. 28 galvanized, 3.38c.; No. 10 blue annealed, 1.83c. Prices from store, Chicago, are: No. 10, 2.10c. to 2.20c.; No. 12, 2.15c. to 2.25c.; No. 28 black, 2.75c. to 2.85c.; No. 28 galvanized, 3.65c. to 3.75c.

Bars.—Car building has been so extremely quiet for the last few months that comparatively little bar iron has gone into that channel. Wagon and implement manufacturers have, however, enjoyed a very fair business, and are to-day using a good share of the output. There is a moderate demand for steel bars, although mills could take on more work without being at all crowded. Prices are as follows: Soft steel bars, 1.58c.; bar iron, 1.25c. to 1.30c.; hard steel bars rolled from old rails, 1.35c. to 1.40c., all Chicago; from store, soft steel bars, 1.80c. to 1.90c.

Wire Products.—Planting and harvest time mark two busy periods in the sale of wire products. In the spring crops must be protected as they are planted, and in the fall harvest funds permit improvements long contemplated. Such a vast quantity of wire products goes into these channels that mill activity can be very correctly gauged by farmers' movements. The spring fencing period is now at its hight, and retail stocks are very rapidly finding their way to farms. Small orders to fill in depleted stocks are appearing in every quarter from which nails, wire, fencing, &c., are being sold. Fabricators are reporting one of the very best seasons in their history. Jobbers' carload prices, which are quoted to manufacturing buyers, are as follows: Plain wire, No. 9 and coarser, base, 1.78c.; wire nails, 1.98c.; painted barb wire, 1.98c.; galvanized, 2.28c.; polished staples, 1.98c.; galvanized, 2.28c., all Chicago.

Cast Iron Pipe.—The only sale of note that has been closed in this market the past week was made by the leading interest to the city of Elyria, Ohio, where a new water works system is being installed and 1500 tons of pipe will be used. The larger gas pipe specifications are believed to be pretty well in. The Pacific Coast cities have been particularly active purchasers of gas pipe this year, Portland, Seattle and Tacoma heading the list. The Portland Gas & Coke Company has purchased 12,000 tons of gas pipe this spring from the United States Cast Iron Pipe & Foundry Company, which made shipments from its Chattanooga plant. It is interesting to note one of the advertising opportunities accepted by this gas company, which directed the shipment of a complete trainload of its pipe at one time. Thirty cars of 30,000 lb. capacity were loaded and shipped intact to the Minnesota Transfer, from which point they were hauled to Portland, Ore., by daylight. Arrangements were made with the newspapers in the principal cities along the route and the exceptional shipment was given much publicity. Everything seems to indicate that this will be a satisfactory business year in the pipe industry. Prices remain firm, per net ton, Chicago: Water pipe, 4-in., $25.50; 6 to 12 in., $24.50; 16-in. and up, $24, with $1 extra for gas pipe.

Old Material.—Consumers are well taken care of, and prices are being held up only because brokers are still busy filling purchases made some time ago. It is expected that this week will see these contracts fairly well filled and price changes may follow. The Milwaukee Railroad is out with a list of 500 tons of car wheels which closes April 11. This item is in fair demand and it is expected that a ready sale will be made. The time honored list of the Atchison, Topeka & Santa Fe has again appeared, but it has been swelled to the great total of 27,000 tons. This list closes April 10 and is one of the largest accumulations of railroad scrap

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ever listed. There is little trading in this market and nothing that would indicate activity in the near future. Prices are for delivery to buyers' works, all freight and transfer charges paid, and are as follows. per gross ton:

Old iron rails	$14.50 to $15.00
Old steel rails, rerolling	13.25 to 13.75
Old steel rails, less than 3 ft	12.75 to 13.25
Relaying rails, standard sections, subject to inspection	23.00 to 24.00
Old car wheels	13.25 to 13.75
Heavy melting steel scrap	11.50 to 12.00
Frogs, switches and guards, cut apart	11.75 to 12.25
Shoveling steel	11.00 to 11.50

The following quotations are per net ton:

Iron angles and splice bars	$12.50 to $13.00
Iron arch bars and transoms	14.00 to 14.50
Steel angle bars	11.00 to 11.50
Iron car axles	19.00 to 19.50
Steel car axles	18.00 to 18.50
No. 1 railroad wrought	11.50 to 12.00
No. 2 railroad wrought	10.50 to 11.00
Steel knuckles and couplers	10.50 to 11.00
Locomotive tires, smooth	17.00 to 17.50
Steel axle turnings	8.00 to 8.50
Machine shop turnings	6.50 to 7.00
Cast and mixed borings	5.25 to 5.75
No. 1 busheling	9.50 to 10.00
No. 2 busheling	7.25 to 7.75
No. 1 boilers, cut to sheets and rings	8.25 to 8.75
Boiler punchings	12.50 to 13.00
No. 1 cast scrap	11.75 to 12.25
Stove plate and light cast scrap	9.75 to 10.25
Railroad malleable	11.00 to 11.50
Agricultural malleable	10.00 to 10.50
Pipes and flues	8.50 to 9.00

Philadelphia

PHILADELPHIA, PA., April 11, 1911.

The market in practically all lines has taken on a waiting attitude. Several propositions of good size, both in crude and finished products, which have been under negotiation for some time, have developed into orders, but there is a decided lack of snap when it comes to considering new business.

Iron Ore.—Some inquiry for foreign low phosphorus ore is reported and negotiations for further supplies of Swedish ore are pending. Importations at this port during the week aggregated 18,784 tons, all Swedish ore, valued at $108,031. The largest individual cargo of ore ever received at this port, 11,600 tons, on the steamship Tellus, is included in the week's arrivals.

Pig Iron.—While several of the important negotiations pending last week have been closed, and an occasional inquiry for a fair sized lot is reported, the market generally has a quieter appearance. The Pennsylvania Railroad placed its order for 5300 tons of coke and charcoal foundry iron late in the week, this being for second quarter delivery. A transaction covering 18,000 tons of Southern iron, mixed grades, on a sliding scale, briefly reported last week, was also closed. This was virtually the renewal of an expiring contract with one of the local cast iron pipe foundries, and deliveries will be taken at the rate of 3000 tons a month. Inquiries are out for two lots of low grade iron for Delaware River pipe foundries, one of 4000 and the other 5000 tons, for second quarter delivery. Malleable iron consumers are testing the market for last half delivery, but no transactions are reported. In the higher grades of foundry iron the movement has been light. Inquiries are mostly for small prompt lots, although one for 500 tons of No. 2 X and another for 1800 tons, equally divided between Nos. 1, 2 and 3, for second quarter shipment, are reported. Prices are being well maintained, $15.50 to $16, delivered, representing the market for the usual standard brands of eastern Pennsylvania No. 2 X foundry for second quarter shipment. The volume of inquiry for forward delivery is not so large, and it is stated that producers are not so insistent on advances for third quarter iron as they were several weeks ago. No open quotations for extended delivery have, however, been announced. There has been a moderate small lot movement in Virginia foundry grades, and prices of No. 2 X and No. 2 plain iron are generally quoted at $13, furnace, for second quarter, the leading interest having receded from its position of holding for an advance of 50c. a ton for such delivery. The movement in forge iron has not been active, although some unclosed inquiries are reported. The supply of the better grades is limited and $15, delivered, about represents the minimum for the best known brands, although $14.75 could probably still be done for other makes. Basic iron is at a standstill and $15.25, delivered, is a nominal quotation. Sales of low phosphorus iron have been confined to small lots at recent quotations. Meetings of the Eastern Pig Iron Association and the Virginia Pig Iron Association, held in this city last week, were not productive of any important details, both reported stocks showing a slight decrease. Shipments continue somewhat in excess of the current make and deliveries are being freely taken by consumers. The following range of quotations represents the market for standard brands, delivered in buyers' yards in this district, in the second quarter:

Eastern Pennsylvania, No. 2 X foundry	$15.50 to $16.00
Eastern Pennsylvania, No. 2 plain	15.25 to 15.50
Virginia, No. 2 X foundry	15.80 to 16.00
Virginia, No. 2 plain	15.80 to 16.00
Gray forge	14.75 to 15.25
Basic	15.25 to 15.50
Standard low phosphorus	21.50 to 22.00

Ferromanganese.—While there has been no demand of importance from consumers in this district, prices are weak on sales in other markets and a nominal quotation of $37 to $37.25, Baltimore, is named by sellers for small lots for either prompt or forward shipment.

Billets.—Business is still confined to small, prompt lots, consumers being disinterested in supplies for extended delivery. Day to day orders are of sufficient size, however, to enable mills to maintain a fairly even productive rate. Quotations are unchanged, $25.40 being named for open hearth rolling billets and $30.40 for ordinary forging billets, delivered in this vicinity.

Plates.—A very good run of orders for business of a miscellaneous character is reported, but they are gradually decreasing in size and the aggregate volume coming to the mills has diminished; hence finishing departments are a little less actively engaged. Specifications for bridge work are coming out freely and some business for car work has been definitely placed, particularly one lot of some 2000 to 3000 tons for cars to be built by the Pennsylvania Railroad at its Altoona shops. While there is a fair volume of boat business ahead, it develops slowly. Prices are being fully maintained at the recent level, 1.55c. minimum for ordinary plates, delivered in this district.

Shapes.—Both mills and fabricators are figuring on a good amount of business, but no contracts of importance have been closed. The new Reading Hotel, Reading, Pa., is again under consideration, the original requirements having been considerably reduced. A sizable tonnage for car work, which has been under negotiation for the Pennsylvania Railroad, is said to have been definitely placed. Very low prices for fabricated work are still reported, but thus far have not affected plain shapes, which continue to be maintained at 1.55c. minimum, delivered in this vicinity.

Sheets.—There is a continued day to day demand, which in the aggregate is sufficient to enable mills to about maintain a regular output, but the situation is unfavorable from a mill standpoint, as there is little business ahead, consumers showing no interest in placing orders for extended delivery. Eastern mill quotations for prompt shipment are as follows: Nos. 18 to 20, 2.50c.; Nos. 22 to 24, 2.60c.; Nos. 25 and 26, 2.70c.; No. 27, 2.80c.; No. 28, 2.90c.

Bars.—Consumers of refined iron bars are placing business sparingly in view of possible price recessions. Small orders are being taken at the recent minimum, 1.37½c., delivered in this vicinity, although it is believed that on desirable specifications 1.35c. could be done. A moderate movement in steel bars is reported at 1.55c., delivered in this territory, being maintained.

Old Material.—The market continues quiet. Consumers show little interest in the situation and when offers are made they are usually below prices recently paid. The demand for heavy melting steel is light, and the bulk of the transactions have been between dealers. Mills take on occasional bargain lots but are pretty well supplied. Rejections owing to grade have, in at least in one instance, been particularly heavy, especially when shipments are against high priced orders, on which consumers insist on getting strictly prime material. Rolling mills have not been very active buyers. The market throughout has a rather weak appearance. The following range of prices, while to some extent nominal, about represents the market for deliveries in buyers' yards, eastern Pennsylvania and nearby points, carrying a freight rate from Philadelphia ranging from 35c. to $1.35 per gross ton:

No. 1 heavy melting steel scrap	$13.50 to $13.75
Old steel rails, rerolling	14.50 to 15.00
Low phosphorus heavy melting steel scrap	17.75 to 18.25
Old steel axles	20.00 to 20.50
Old iron axles	25.00 to 26.00*
Old iron rails	17.50 to 18.00*
Old car wheels	13.25 to 13.75
No. 1 railroad wrought	16.00 to 16.50
Wrought iron pipe	13.50 to 14.00
No. 1 forge fire	11.75 to 12.25
No. 2 light iron	7.50 to 8.00*
Wrought turnings	9.00 to 9.50
Cast borings	8.25 to 8.75
Machinery cast	13.75 to 14.25
Railroad malleable	12.00 to 12.50
Grate bars	11.50 to 12.00
Stove plate	10.50 to 11.00

* Nominal.

Coke.—Spot coke appears to be accumulating and ef-

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forts to move it are reported to have resulted in lower quotations, particularly for furnace coke. The demand for foundry coke is not urgent. The whole market, in fact, has an easier appearance. For the better grades prices are well maintained. Spot foundry coke is in instances quoted at $2 per net ton, at oven, with forward coke at $2.20 to $2.40. Spot furnace coke has been reported sold at $1.55, with forward deliveries quoted at $1.70 to $1.90, ovens. The following range per net ton represents the market for delivery in this territory:

Connellsville furnace coke	$3.70 to $4.05
Foundry coke	4.15 to 4.55
Mountain furnace coke	3.30 to 3.65
Foundry coke	3.75 to 4.15

Cleveland

CLEVELAND, OHIO, April 11, 1911.

Iron Ore.—No meeting to consider ore prices has yet been held, but action may be taken any day. Representatives of the leading ore firms decline to express their individual opinions as to what will or should be done. Furnacemen generally feel, however, that there will be a reduction in prices of 25c. and possibly 50c. a ton. Dock shipments have improved somewhat. The total shipments from the docks in April were nearly 1,000,000 tons. No chartering of vessel tonnage for ore has been done as yet, and carrying rates have not been fixed, but it is expected that they will be the same as last year. We quote prices as follows: Old Range Bessemer, $5; Mesaba Bessemer, $4.75; Old Range non-Bessemer, $4.20; Mesaba non-Bessemer, $4.

Pig Iron.—Inquiries are light. The only sale of any size reported is 1500 tons of No. 2 Southern to a Barberton, Ohio, plant, for delivery through the second, third and fourth quarters, the buyer paying $11, Birmingham, for the second quarter and $11.25 for the last half. A Cleveland foundry that recently had an inquiry out for 1000 tons of Southern but deferred purchasing is again feeling the market on prices. Prices are firm at $13.75 to $14, Cleveland and Valley furnaces, for the second quarter, and $14.25 to $14.50 for the last half. For prompt shipment and the second quarter we quote, delivered, Cleveland, as follows:

Bessemer	$15.90
Northern foundry, No. 1	14.50
Northern foundry, No. 2	14.25
Northern Foundry, No. 3	14.00
Gray forge	13.50
Southern foundry, No. 2	15.35
Jackson Co. silvery, 8 per cent. silicon	18.00

Coke.—Little demand is coming out for foundry coke for the last half, and foundries generally are expected to defer placing contracts until June. There is some demand for small lots for spot shipment. No inquiry is reported for furnace grades. We quote standard Connellsville furnace coke at $1.60 to $1.65, per net ton, at oven, for spot shipment, and $1.75 to $2 for the last half. Connellsville foundry coke is held at $2 for prompt shipment and $2.25 to $2.50 for the second half.

Finished Iron and Steel.—Some of the mill agencies report a slight improvement in orders, which fell off somewhat late in March. A fair volume of specifications is coming out, but new business is nearly all in very small lots. New inquiries are light. Another contract for a lake boat was placed this week, the Toledo Shipbuilding Company receiving an order from the Mackinac Transportation Company for a steel car ferry boat, to be built in time to be placed in commission next October. The builder is now negotiating for the steel required, namely, 2500 tons of plates and shapes. No inquiries for round lots of structural material have developed. The legal formalities in connection with the extensive grade crossing elimination planned by the Pennsylvania Railroad in Cleveland have been completed, and unless unforeseen obstacles arise bids will probably be advertised for early in June. The City Council has just authorized the elimination of a number of Nickel Plate grade crossings on the west side in Cleveland, and it is expected that this work will be started during the year. Several new building projects in the city have also developed during the past week, which, if carried out, will require considerable tonnage. Prices on steel bars, plates and shapes are firm at 1.40c., Pittsburgh. The demand for sheets is moderate, but prices seem to be quite well maintained. Rivets are weaker than they have been recently, and there is at present virtually an open market. Some business in boiler rivets is being taken at 1.80c., but a price of 1.75c., Pittsburgh, is being quoted by some of the mills, which is $5 a ton lower than the regular price. Forging billets are moving fairly well in carload lots. There is a good inquiry for small lots of light rails. The demand for iron bars is moderate, with prices stationary at 1.30c. to 1.35c., at mill.

Old Material.—Practically nothing is doing in the scrap market. The continued inactivity has resulted in a weakening of prices. Quotations on several grades have been reduced about 50c. a ton. For heavy melting steel scrap local mills are declining to pay the present minimum quotation of $12.75. Very little scrap is being offered at present. Dealers cannot afford to sell their stock at ruling prices, and to save themselves from losses will wait for a firmer market. The Michigan Central Railroad closed April 11 on its usual list. The Pennsylvania Railroad has a large list out, on which it will close April 13. Dealers' prices per gross ton, f.o.b. Cleveland, are as follows:

Old steel rails	$13.50 to $14.00
Old iron rails	16.00 to 16.50
Steel car axles	19.50 to 20.00
Heavy melting steel	12.75 to 13.00
Old car wheels	13.00 to 13.50
Relaying rails, 50 lb. and over	22.50 to 23.50
Agricultural malleable	11.50 to 12.00
Railroad malleable	12.75 to 13.00
Light bundled sheet scrap	8.00 to 8.50

The following prices are per net ton, f.o.b. Cleveland:

Iron car axles	$21.00 to $21.50
Cast borings	6.50 to 6.75
Iron and steel turnings and drillings	7.25 to 7.75
Steel axle turnings	9.00 to 9.25
No. 1 busheling	10.50 to 11.00
No. 1 railroad wrought	13.00 to 13.25
No. 1 cast	11.75 to 12.00
Stove plate	11.00 to 11.25
Bundled tin scrap	11.00 to 11.50

The Balkwill Pattern Company, 1444 East Forty-ninth street, Cleveland, Ohio, has changed its name to the Wellman Pattern Supply Company. This company will take over the business of the Cleveland Fillet Company, a closely allied corporation. The company is now operating a department for general machine work and will make a specialty of high grade screw machine products. Its other products include wood and metal patterns, wood turnings, white metal and brass pattern letters, wood and leather fillet, brass dowel pins and plates, wood dowel pins, foundry chaplets and patternmakers and foundry supplies.

Cincinnati

CINCINNATI, OHIO, April 12, 1911.—(*By Telegraph.*)

Pig Iron.—So far as activity is concerned, the market has eased back into the same old rut. Sales and inquiries have dwindled to a very limited number and both buyers and sellers are apathetic. Shipments on contracts continue to move freely, and, due to a curtailment in production in the Ironton district, there is said to be a steady decrease in the total of blast furnace stocks. An Illinois melter is asking for 500 tons of high silicon, to be delivered within the next three months, and there are a few inquiries for foundry iron from Michigan and Indiana that are still hanging fire. Basic and malleable are both dull. There is no confirmation of outside reports that Southern No. 2 foundry is being shaded here below $11, Birmingham, for spot shipment, but it is admitted that several producers are quoting present prices on contracts running through the third quarter, and in a few instances throughout the entire year. Northern iron remains at $14, Ironton, for shipment until July 1, but deliveries are also being extended, and no doubt third quarter contracts can be signed up at the price named. A small lot of Southern gray forge was sold last week to an Ohio manufacturer at $10, Birmingham, for future delivery, but $9.75 represents the prompt shipment quotation. Based on freight rates of $3.25 from Birmingham and $1.20 from Ironton, we quote, f.o.b. Cincinnati, as follows, for first quarter:

Southern coke, No. 1 foundry	$14.75
Southern coke, No. 2 foundry	14.25
Southern coke, No. 3 foundry	13.75
Southern coke, No. 4 foundry	13.50
Southern coke, No. 1 soft	14.75
Southern coke, No. 2 soft	14.25
Southern gray forge	13.00
Ohio silvery, 8 per cent. silicon	17.70
Lake Superior coke, No. 1	15.70
Lake Superior coke, No. 2	15.20
Lake Superior coke, No. 3	14.70
Standard Southern car wheel	25.25
Lake Superior car wheel	19.50

(*By Mail.*)

Coke.—The market for both furnace and foundry coke is dragging. Consumers are holding back on making contracts, following the same policy as that of several weeks ago. It is stated that there is considerable furnace coke in all three fields, that producers are anxious to get moved, and in some cases there is room for believing that prices have been shaded a few cents. This same condition applies to foundry grades, but for the regular standard market brands we quote 48-hour coke at $1.55 to $1.60 and 72-hour coke around $2 per net ton at oven for prompt shipment,

THE IRON AND METAL MARKETS

with the usual premium of 15c. to 25c. per ton asked on time contracts. These prices rule in all three districts.

Finished Material.—The past week was reported as being fairly satisfactory. The movement of plates and boiler tubes shows that boiler manufacturers are getting busier. Reinforcing concrete bars are also in demand. The mill price is 1.40c., Pittsburgh, and the local warehouse price will average about 1.90c.

Old Material.—The market is very sluggish, and while yard stocks are not so heavy as they have been it is understood that dealers have a large amount of scrap bought that has not yet been shipped in. Prices are weak, and another cut is expected to take place soon. Prices for delivery in buyers' yards, southern Ohio and Cincinnati, are as follows:

No. 1 railroad wrought, net ton	$11.50 to $12.00
Cast borings, net ton	4.75 to 5.25
Steel turnings, net ton	5.75 to 6.25
No. 1 cast scrap, net ton	10.50 to 11.00
Burnt scrap, net ton	7.50 to 8.00
Old iron axles, net ton	16.50 to 17.00
Bundled sheet scrap, gross ton	8.00 to 9.00
Old iron rails, gross ton	14.00 to 15.00
Relaying rails, 50 lb. and up, gross ton	21.00 to 22.00
Old car wheels, gross ton	11.50 to 12.50
Heavy melting steel scrap, gross ton	10.50 to 11.00

St. Louis

ST. LOUIS, MO., April 10, 1911.

While the demand for pig iron and coke is dull, encouraging indications of growth in business are offered by the steps being taken by some local steel and iron foundries to enlarge their plants, and the formation of new corporations identified with the steel and iron industry in and near St. Louis. Moderate purchases of finished material and tools are being made by the railroads. The demand for finished metals is satisfactory.

Pig Iron.—The demand for pig iron is very limited, probably not over 1500 tons having been sold the past week in the aggregate in this market. Inquiries, too, were few in number and small in tonnage. The leading sellers are not so much surprised with respect to small sales, in view of the activity of the past three months, as with the utter lack of interest in the market. Even merchant sellers complain of dullness, and this makes it more pronounced, in view of the fact they deal with foundries which buy little and often, and cover a wide range of territory. We continue our quotations for No. 2 Southern foundry at $11, Birmingham, for shipment over the second and third quarters, and $11.50 for fourth quarter; No. 2 Northern foundry, $14, Ironton, Ohio, for shipment over the second quarter, and $14.50 for last half delivery.

Coke.—One house reports inquiries for foundry coke aggregating 1600 tons, but the rest have had none of consequence during the past week. No sales beyond carload lots were mentioned. There is no change in prices.

Old Material.—The market is stagnant. An east side steel foundry is willing to take on considerable tonnage, but at prices that holders will not accept. With this exception there is no demand of consequence from consumers, and there is very little business passing between dealers. Considerable movement is going on in filling previous contracts. The following railroad offerings for the week were reported: Vandalia Line, 200 tons; Southern Railway, 200 tons; Kansas City Southern Railroad, 200 tons. The market is weaker and prices on a part of the list are lower. We quote dealers' prices, per gross ton, f.o.b. St. Louis:

Old iron rails	$13.50 to $14.00
Old steel rails, rerolling	12.25 to 12.75
Old steel rails, less than 3 ft.	11.00 to 11.50
Relaying rails, standard sections, subject to inspection	23.00 to 23.50
Old car wheels	12.50 to 13.00
Heavy melting steel scrap	11.00 to 11.50
Frogs, switches and guards, cut apart	11.00 to 11.50

The following quotations are per net ton:

Iron fish plates	$11.00 to $11.50
Iron car axles	18.00 to 18.50
Steel car axles	17.50 to 18.00
No. 1 railroad wrought	11.00 to 11.50
No. 2 railroad wrought	10.00 to 10.50
Railway springs	9.50 to 10.00
Locomotive tires, smooth	16.00 to 16.50
No. 1 dealers' forge	9.00 to 9.50
Mixed borings	4.50 to 5.00
No. 1 busheling	9.50 to 10.00
No. 1 boilers, cut to sheets and rings	8.00 to 8.50
No. 1 cast scrap	11.00 to 11.50
Stove plate and light cast scrap	8.50 to 9.00
Railroad malleable	7.50 to 8.00
Agricultural malleable	8.50 to 9.00
Pipes and flues	8.00 to 8.50
Railroad sheet and tank scrap	7.50 to 8.00
Railroad grate bars	8.00 to 8.50
Machine shop turnings	6.50 to 7.00

Finished Iron and Steel.—The Missouri, Kansas & Texas Railroad is in the market for 100 miles of 85-lb. standard rails, and another Western trunk line has an inquiry out involving about the same tonnage. There is also some inquiry from interurban electric lines. The demand for structural material is slow. For bars there is some inquiry from jobbers. The demand for track material is fairly active.

The State Supervisor of Statistics reports that Missouri's foundry and machine shop output increased from a value of $14,692,000 in 1904 to $22,023,000 in 1909, and the number of producing establishments from 256 to 331. In the same five years the capital invested grew from $14,097,000 to $23,946,000.

Birmingham

BIRMINGHAM, ALA., April 10, 1911.

Pig Iron.—A lot of 1000 tons of No. 2 soft, for shipment commencing immediately and extending through the third quarter, was sold in this market the past week at $11, Birmingham. Another lot of 1000 tons of No. 2 foundry for shipment over the last half brought the same price. With the exception of these transactions the buying was confined to small lots for prompt shipment, in which the $11, Birmingham, basis was fully maintained. The current quotation for strictly last quarter deliveries is $11.50, Birmingham, for No. 2 foundry. As is indicated above, certain of the producing interests would not refuse tonnage for the entire last half at $11, but that price is not being quoted other than for the third quarter. Two of the producing concerns are disposed to sell only against such tonnage as is now actually on their furnace yards, while a third adheres strictly to $11.50 for deliveries after July 1. The inquiry being received is of fair volume, but with the prospective buyers apparently disposed to await further developments. There has certainly been no inducement offered in the shape of a concession from the $11 schedule, and as warrant yard holdings were increased during the month of March, rather than make concessions in order to move the surplus production, it hardly seems probable that a decline will be suffered. Reports for April 1 show a decrease in the aggregate stock in this State of only some 3000 tons. The total production for the month of March was considerably larger than for the month previous, however, and the month of April started with two more stacks in operation than were being operated March 1. The total of coke furnace operations in this State at present is 19 stacks, three of which are running on basic iron. It is not probable that the production will change this month, and there are reasons to anticipate a larger rate of consumption. Only two stacks in this district are now producing charcoal iron and the order books of such producers are understood to represent a larger tonnage when compared with the output than for a long time. The price for chilling grades of charcoal iron is firm, at $22 to $23, at furnace, for delivery during the remainder of the first half.

Cast Iron Pipe.—An aggregate of 2000 to 3000 tons of water pipe was placed with Southern manufacturers the past week. The tonnage reported consisted of comparatively small lots and the prices received were very satisfactory. It is announced that two contracts for 1000 tons of water pipe each will be placed the coming week, and an aggregate of some 5 miles of smaller sizes than 10-in. is now pending. The stock of "seconds" and other grades suitable for culvert and similar work has been practically depicted as a result of the buying by railroad interests and class A pipe in all sizes is very scarce. We quote water pipe firm at the following prices per net ton, f.o.b. cars here: 4 to 6 in., $23; 8 to 12 in., $22; over 12-in., average $21, with $1 per ton extra for gas pipe.

Old Material.—The available stock has been increased by the offerings of railroad companies and receipts from the rural districts. The demand from the consuming interests continues very light, but the tonnage involved in the shape of bargain transactions is fairly attractive. It is believed that dealers generally are making more effort to increase their holdings than for some months, which is within itself an encouraging feature in the market situation. By reason of the nature of recent transactions the status of prices cannot be determined with accuracy. We quote dealers' asking prices nominally as follows, per gross ton, f.o.b. cars here:

Old iron axles	$14.00 to $14.50
Old iron rails	12.50 to 13.00
Old steel axles	12.50 to 13.00
No. 1 railroad wrought	12.00 to 12.50
No. 2 railroad wrought	9.50 to 10.00
No. 1 country wrought	8.00 to 8.50
No. 2 country wrought	7.50 to 8.00
No. 1 machinery	10.00 to 10.50
No. 1 steel	9.50 to 10.00
Tram car wheels	9.00 to 9.50
Standard car wheels	10.50 to 11.00
Light cast and stove plate	8.00 to 8.50

THE IRON AND METAL MARKETS

New York

NEW YORK, April 12, 1911.

Pig Iron.—While the pig iron market is uninteresting, and from the producer's standpoint quite unsatisfactory, a fair amount of business is done each week. About half the foundries have taken on some pig iron for the third quarter or second half, and comparatively little buying remains to be done for the second quarter. Some producers have maintained fairly well the higher price asked for the second half, but there is no uniformity in this regard and a number of buyers have been able to get iron for the third quarter at close to the figures asked for early delivery. A manufacturer of sanitary pipe is in the market for 5000 tons for a New Jersey plant and for 1500 to 3000 tons for a New York State plant. A New Jersey manufacturer of furnace castings has bought 1000 tons the last week and a boiler manufacturer is in the market for a like amount. In some cases Buffalo furnaces are basing quotations on Eastern delivery on a canal freight of $1.25, while other furnaces are still quoting f.o.b. boat at Buffalo. The statistics of the Virginia and Eastern Pennsylvania furnaces show that stocks were reduced in March, while orders on hand April 1 were about the same as one month previous. We quote for tidewater delivery as follows: Northern No. 1 foundry, $15.75 to $16; No. 2 X, $15.50 to $15.75; No. 2 plain, $15.25 to $15.50; Southern No. 1 foundry, $15.50 to $16; No. 2, $15.25 to $15.50.

Finished Iron and Steel.—The steel bar, plate and structural mills are running at about the same capacity, between 60 and 70 per cent. Since the last of February there has been little change in any of these lines. Bar iron temporarily improved but later fell back to the former level and continues about the same. Steel bars have yet to hear anything very definite from the implement makers, and at present the mills are not receiving very satisfactory specifications. Plate contracts generally are not as large as usual at this season, and seldom go much beyond immediate demands. The same is true in orders for stock of structural material. The latter trade has some improvement in sight from the several new inquiries in the market, most of which, however, are for relatively small lots. Milliken Brothers, Inc., have the 3000 tons for the Trinity Corporation's printing building and will use Bethlehem shapes. The Phoenix Iron Company has 1000 tons for the Elizabethport shops of the Central Railroad of New Jersey; the Pennsylvania Steel Company, 500 tons for freight sheds at Harrisburg, Pa., for the Pennsylvania; the American Bridge Company, 600 tons for elevated structure reinforcing for the Interborough Rapid Transit Company, New York; 450 tons for the New England Telegraph & Telephone Company's building at Portland, Me., and 300 tons for the Merchants' Real Estate Trust building in Boston; Levering & Garrigues, 425 tons for the Turnbull Estate loft at Grand and Centre streets, New York; the McClintic-Marshall Construction Company, 360 tons for the Alexander Brothers store in Philadelphia; the Lackawanna Bridge Company, 200 tons for the Utica Central Fire station, Utica, N. Y., and the New England Structural Company, 130 tons for a small bridge for the Boston & Maine at Somerville, Mass. Bids have closed on the following, but no awards have been made: 500 tons for the A. J. Ordway building, Newark, N. J.; 1600 to 1700 tons of steel car center sills for the Chesapeake & Ohio; 500 tons for a steel and concrete bridge over the Central Railroad of New Jersey tracks for the Hudson County Boulevard Commission; 7500 to 8000 tons for the Insurance Exchange Building, 80 Maiden Lane, New York; 300 tons of bridge material for the Atlantic Coast Line; 150 tons for spans and extensions to the present trestle on the Boston & Albany over the Charles River near Cottage Farm; over 200 tons for two bridges for the New York Central, one at Watertown and the other at Oriskany, N. Y. Bids also closed last week on 1200 tons of boiler supports for the Lehigh Coal & Iron Company. Bids will close April 15 on 1000 tons for the Reither Building, Waterbury, Conn. Other inquiries in the market are for 4000 tons for the 14-story Pennsylvania Hotel, Pittsburgh, Pa.; 200 tons for a three-track highway bridge for the Erie; 200 tons for foundation grillage of 18 and 24 in. beams for the barge office and two bridges for the Boston & Maine, one of 75 tons at Thayer, Mass., and one of 60 tons at St. Johnsbury, Vt. Prices are firm and without change: Plain structural material, plates and steel bars, 1.56c. to 1.61c., and bar iron, 1.40c. to 1.45c., all New York. Store prices for plates and plain material, New York, are 1.85c. to 1.95c.

Ferroalloys.—Very little interest is being shown in ferrosilicon, and the market is about $53 to $54, Pittsburgh. Outside of one large inquiry from the Pittsburgh district, the ferromanganese demand is light. Buyers seem to run along the line of very cheap prices. The usual quotation in New York is $37.50 to $38, seaboard.

Cast Iron Pipe.—John Fox & Co. were the lowest bidders for the 1025 tons of pipe and 155 tons of special castings for which bids were opened by the New York Department of Water Supply, Gas and Electricity April 5. The bid on the pipe was $21.85 per ton; on special castings, $43, and on valve boxes, $40. The most important public lettings now in sight are those of New Bedford, Mass., for 3370 tons; Attleboro, Mass., 1500 tons; Fulton, N. Y., 370 tons, and Bloomfield, N. J., 100 tons, on all of which bids will be opened April 17. Public lettings are much below the average for the season, but private buying is about normal. Pipe manufacturers in this part of the country are apparently facing a scarcity of the grades of pig iron which they favor. The number of Eastern blast furnaces in operation has been greatly reduced, and the Southern supply of low grades is light. One of the buildings of the Camden Iron Works of R. D. Wood & Co., at Camden, N. J., was burned last week, with a loss of $15,000. Prices on carload lots of 6-in. continue to range from $21 to $22 per net ton, tidewater.

Steel Rails.—The Harriman rail order was about the expected amount, so far as the Steel Corporation mills are concerned—a total of 39,225 tons, of which 21,225 tons of Bessemer rails will be rolled by the Illinois Steel Company and 18,000 tons of open hearth rails by the Tennessee Company. In addition, the Colorado Fuel & Iron Company was given an order for about 33,000 tons, making a total of 72,000. It is expected that the Harriman lines will make further purchases later in the year. Other rail buying in the past week has been relatively small. The Seaboard Air Line is understood to have placed an order with the Maryland Steel Company. Its original inquiry was for 7000 to 12,000 tons. The Richmond, Frederick & Potomac has bought 1000 tons from the Maryland Steel Company and the Boston Elevated 600 tons of Bessemer rails from the Pennsylvania Steel Company. The Boston Elevated has ordered 1200 tons of open hearth rails from the Bethlehem Steel Company. The Brooklyn Rapid Transit has ordered 2000 tons. In the past week the Illinois Steel Company has booked 3300 tons, of which 2500 tons were for an Illinois line. The Tennessee Company booked 735 tons for the Galveston, Houston & Henderson, and 700 tons in scattering orders.

Old Material.—The most interesting local transaction of the week was the sale of a lot of 500 tons of old horseshoes. It seldom happens in these days that such a quantity of this class of old material is offered for sale and it represents a long accumulation. It was moved at about $12.50 per ton, New York. Transactions in other classes of old material have been quite light. Small quantities of heavy melting steel scrap have been bought by dealers who still have contracts to fill, but consumers are making new purchases sparingly, doing so only when choice material is offered at attractive prices. Rejections continue to be made for comparatively unimportant reasons, thus forcing dealers to accept lower than contract prices. The general situation is thus very unsatisfactory. All grades of foundry scrap are in exceedingly light demand. Rolling mills are almost completely out of the market. Dealers' quotations are as follows, per gross ton, New York and vicinity:

Old girder and T rails for melting	$10.50 to $11.00
Heavy melting steel scrap	10.50 to 11.00
Relaying rails	20.00 to 21.00
Standard hammered iron car axles	21.50 to 22.00
Old steel car axles	16.00 to 16.50
No. 1 railroad wrought	13.00 to 13.50
Wrought iron track scrap	12.50 to 13.00
No. 1 yard wrought, long	12.00 to 12.50
No. 1 yard wrought, short	10.50 to 11.00
Light iron	5.00 to 5.50
Cast borings	5.50 to 6.00
Wrought turnings	6.00 to 6.50
Wrought pipe	10.50 to 11.00
Old car wheels	11.50 to 12.00
No. 1 heavy cast, broken up	11.50 to 12.00
Stove plate	9.00 to 9.50
Locomotive grate bars	9.50 to 10.00
Malleable cast	10.50 to 11.00

Buffalo

BUFFALO, N. Y., April 11, 1911.

Pig Iron.—Inquiry has been extremely light the past week and sales were correspondingly slow. Such inquiries as have been received were largely for third quarter and last half delivery, and principally from stove, agricultural implement and pipe makers. There has been some little buying in malleable, aggregating about 3000 tons, for second quarter delivery. A little inquiry for basic has been received from Canada; also for one small lot for export from the Atlantic Coast. Shipments on contracts are being specified in fairly good volume. Prices are unchanged, as follows, for first half delivery, f.o.b. Buffalo:

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No. 1 X foundry	$14.25 to $14.75
No. 2 X foundry	14.00 to 14.50
No. 2 plain	13.75 to 14.00
No. 3 foundry	13.50 to 13.75
Gray forge	13.25 to 13.50
Malleable	14.00 to 14.50
Basic	14.25 to 15.00
Charcoal	16.75 to 17.50

Finished Iron and Steel.—Most sales agencies report current specifications on contracts and mill bookings keeping up well, although one or two state that the week has shown a slight falling off in new business. One of the leading interests reports a good sized contract for steel bars, also further activity in the demand for track materials from both traction and steam lines in Canada. Continued activity is also noted in fabricated structural lines, most of the local shops being pretty well supplied with work, made up principally of small orders. The Eastman Kodak Company, Rochester, is calling for preliminary estimates for another building to be added to its plant requiring 275 tons. Figures will soon be asked for an extensive addition to the Hamot Hospital, Erie, Pa., and for a nurses' home for the same institution, requiring a considerable tonnage. The contract for steel for the Fire Proof Film Company's factory building at Rochester, about 200 tons, was taken by the F. L. Hughes Company of that city.

Old Material.—The market continues very dull, with no new buying, and very moderate deliveries on contracts, owing to present contracts being completed in the majority of instances. In consequence of these conditions prices show a marked falling off. We quote as follows per gross ton, f.o.b. Buffalo:

Heavy melting steel	$12.00 to $12.50
Low phosphorus steel	16.25 to 17.00
No. 1 railroad wrought	15.00 to 15.25
No. 1 railroad and machinery cast scrap	14.25 to 14.50
Old steel axles	19.50 to 20.50
Old iron axles	23.00 to 24.00
Old car wheels	13.75 to 14.25
Railroad malleable	13.50 to 13.75
Boiler plate	10.50 to 10.75
Locomotive grate bars	10.75 to 11.25
Pipe	9.00 to 9.25
Wrought iron and soft steel turnings	6.50 to 7.00
Clean cast borings	6.00 to 6.25

Metal Market

NEW YORK, April 12, 1911.

THE WEEK'S PRICES

Cents Per Pound for Early Delivery.

	Copper, New York.			Lead.		Spelter.	
April	Lake.	Electrolytic.	Tin, New York.	New York.	St. Louis.	New York.	St. Louis.
6	12.45	12.22	{41.45 / 41.50}	4.45	4.30	5.55	5.35
7	12.45	12.22	42.45	4.45	4.30	5.55	5.35
8	12.43	12.20	....	4.45	4.30	5.53	5.32
10	12.40	12.15	42.25	4.45	4.30	5.50	5.30
11	12.37½	12.12½	41.75	4.45	4.30	5.50	5.30
12	12.37½	12.12½	42.25	4.45	4.30	5.50	5.30

For the first time in over six months pig tin sold this week below the cost of importation. Copper has declined ⅛c. Lead is dull but firm. Spelter has a downward tendency. Antimony is cheaper.

Copper.—The Copper Producers' statistics showing the March production to have been the largest on record has had a depressing effect on the market, although the large deliveries recorded offset this sufficiently to prevent a sharp reduction. The price has gradually receded until both lake and electrolytic are ⅛c. cheaper than a week ago. Sales have been good but not large. Inquiries are heavy, but the tone adopted by those asking for quotations indicates that they are looking for cheap copper. Most of the consumers are asking for electrolytic at 12c., and if it gets down to that price it seems likely that a heavy buying movement will ensue. One large selling interest has made offers of lake at 12.40c., delivered in the Naugatuck Valley, 30 days cash, which would bring the spot price in New York under 12.30c. Invariably the asking price for lake, however, is 12.37½c., while electrolytic can be had at 12.12½c. The market in copper wire is moving directly opposite to the general copper market, and bare copper wire has been advanced to 13.75c. per pound. Recently there was some heavy price cutting in copper wire, and large sales were made at 13c. or under. In London to-day the market closed steady, with spot selling at £53 12s. 6d. and futures £54 5s. The sales amounted to 600 tons of spot and 400 tons of futures.

Pig Tin.—A fair business was done in pig tin last Thursday afternoon and again on Friday, but buyers were frightened off on the second day by a sharp advance in the London market, which resulted in a 1c. raise in the price here. The advance, it is said, was caused by heavy buying on the part of agents for the London syndicate. This show of strength on their part is a clear demonstration that the syndicate continues to hold the whip hand. The arrival of the steamer Mesaba with 1025 tons on Monday relieved the situation here, and yesterday for the first time in more than six months pig tin was sold in New York below the cost of importation. It is now ½c. under the corresponding London price. This is only because consumers seem to have filled their wants and there are some anxious sellers. The Mesaba cargo must carry this country for two weeks, as fully that time will elapse before the next steamer arrives, which will bring 1000 tons. Many April contracts will have to be liquidated with the Mesaba tin, and it is improbable that this market will remain under the London market for many days. In New York to-day pig tin was sold for 42.25c. The London market closed firm, with spot tin selling at £194 and futures £189. The sales amounted to 270 tons of spot and 220 tons of futures.

Tin Plates.—Tin plates are quieter, new inquiries being less plentiful. Quotations are unchanged at $3.94 for 100-lb. coke plates.

Lead.—Lead is dull, but firm. The buying is confined to small lots, but inquiries are good. The American Smelting & Refining Company continues to quote 4.50c., so that outside sellers are in control of the situation as they are taking 4.45c. The St. Louis market is steady at 4.30c.

Spelter.—Spelter is easier, with a declining tendency. Consumers are moving cautiously, buying from hand to mouth. Their indifference has induced a number of large sellers to make concessions, as there are some important inquiries out, and intimation has been given that a good reduction in spelter prices would bring about some buying. As the matter stands now, the sellers are reducing quotations a few points at a time and offering slight concessions in order to induce business actually in sight, and the buyers take this as an indication that any heavy purchasing would bring about an advance again. This market is relatively higher than the St. Louis market, because of the absence of spot spelter in New York. In St. Louis plenty of spelter can be bought for 5.30c., while the price of spot here is 5.50c. As the result of the reduction of spelter quotations the manufacturers of sheet zinc have reduced their quotations ¼c. lb.

Antimony.—The United States Government is inquiring for 30,674 lb. of antimony, Cookson's or equal, bids to be opened at the Frankford Arsenal, Philadelphia, April 14, but outside of this business there is little in sight to encourage the dealers who are loaded with stocks. The market has weakened slightly, and Cookson's is now 9.50c.; Hallett's, 9c., and Chinese and Hungarian grades, 8.40c. The latter brands can be had at 10 points less than the spot price for May delivery, but no reduction is made on quotations for Cookson's and Hallett's for future delivery.

Old Metals.—Profound dullness prevails. Dealers' selling quotations are nominally unchanged as follows:

	Cents.
Copper, heavy cut and crucible	11.75 to 12.00
Copper, heavy and wire	11.50 to 11.75
Copper, light and bottoms	10.75 to 11.00
Brass, heavy	8.00 to 8.25
Brass, light	6.75 to 7.00
Heavy machine composition	10.50 to 10.75
Clean brass turnings	7.75 to 8.00
Composition turnings	8.75 to 9.00
Lead, heavy	4.20 to 4.25
Lead, tea	3.95 to 4.00
Zinc scrap	4.25 to 4.30

Metals, St. Louis, April 10.—The market on lead is quiet and unchanged at 4.30c. to 4.32½c.; spelter is lower at 5.27½c. to 5.32c., both at East St. Louis. Zinc ore is lower, owing to a heavy surplus, and a general shut-down is being mooted; we quote $35 to $38 per ton, Joplin base. Tin is higher, quoted at 43.10c.; antimony (Cookson's), 9.85c.; lake copper, 12.85c.; electrolytic, 12.60c., all at St. Louis. The demand for finished metals for the past week was from commercial sources and proved to be a good average.

Metals, Chicago, April 11.—Buying of copper continues on a fair basis, with prices unchanged, but on the whole the market is disappointing. Pig tin is somewhat higher, due rather to speculative influences than any increase in sales. Sheet zinc is ¼c. per pound lower, and is now quoted at $7.50 per cask, f.o.b. La Salle. The market for old metals is still heavy, but with prices practically unchanged. We quote Chicago prices as follows: Casting copper, 12½c.; lake, 12¾c.; in carloads, for prompt shipment; small lots, ¼c. to ⅜c. higher; pig tin, carloads, 43c.; small lots, 45c.; lead, desilverized, 4.35c. to 4.40c., for 50-ton lots; corroding, 4.60c. to 4.65c., for 50-ton lots; in carloads, 2½c. per 100 lb. higher; spelter, 5.40c. to 5.45c.; Cookson's antimony, 10¼c., and other grades, 9c. to 10c., in small lots; sheet zinc is $7.25, f.o.b. La Salle, in carloads of 600-lb. casks. On old metals we quote for less than carload lots: Copper wire, crucible shapes, 12¼c.; copper bottoms, 10¼c.; copper clips, 12c.; red brass, 10½c.; yellow brass, 9c.; lead pipe, 4⅜c.; zinc, 4¼c.; pewter, No. 1, 27c.; tin foil, 32c.; block tin pipe, 35c.

Iron and Industrial Stocks

NEW YORK, April 12, 1911.

Another exceedingly dull week has been experienced in stocks, waiting for the decision of the United States Supreme Court in the Standard Oil and American Tobacco cases. Fluctuations in prices were not important, except in the cases of Steel Foundries, in which a sharp decline occurred, and Can preferred and General Electric, in which there was a pronounced upward movement. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chalm., com.	8	Pressed St., com.	32½- 33
Allis-Chalm., pref.	30¼- 30½	Pressed St., pref.	98⅛- 98⅝
Beth. Steel, com.	32½- 34¼	Railway Spr., com.	32 - 33½
Beth. Steel, pref.	62½- 64½	Railway Spr., pref.	99 -100
Can, com.	9½- 10⅛	Republic, com.	32½- 34
Can, pref.	80⅞- 84⅝	Sloss, com.	52 - 52¼
Car & Fdry, com.	52 - 53½	Pipe, pref.	56⅜- 57
Car & Fdry, pref.	115½-115⅞	U. S. Steel, com.	76⅝- 78⅛
Steel Foundries	39⅝- 46½	U. S. Steel, pref.	118⅝-119⅛
Colorado Fuel	30¾- 32¼	Westinghouse Elec.	66 - 67
General Electric	148½-152½	Va. I., C. & C.	60
Gr. N. ore cert.	61¼- 62¾	Am. Ship, com.	73
Int. Harv., com.	117 -118¼	Chi. Pneu. Tool	51⅝- 53⅛
Int. Harv., pref.	123⅞-124½	Cambria Steel	45 - 47½
Int. Pump, com.	39¾- 40	Lake Sup. Corp.	28¾- 29¼
Int. Pump, pref.	89	Warwick	11
Locomotive, com.	37 - 37½	Crucible St., com.	12¾- 13
Locomotive, pref.	104½-107	Crucible St., pref.	79 - 79¼

Dividends.—The Harbison Walker Refractories Company has declared the regular quarterly dividend of 1½ per cent. on its preferred stock, payable April 20.

The Chicago Pneumatic Tool Company has declared the regular quarterly dividend of 1 per cent., payable April 25.

The Rhode Island Perkins Horseshoe Company has declared the regular quarterly dividend of 1 per cent. on its preferred stock, payable April 15.

The Pittsburgh Coal Company has declared a quarterly dividend of 1½ per cent. on the preferred stock, payable April 25.

The Standard Underground Cable Company, Pittsburgh, has declared a quarterly dividend of 3 per cent.

Notes on Prices

Rope.—A slight improvement in demand is noticed. Prices on manila and the lower grades of sisal rope are somewhat irregular. The following quotations represent general prices to the retail trade in the Eastern market for rope 7-16 in. in diameter and larger, with card advances for smaller sizes: Pure manila of the highest grade, 8½c. to 9c. per pound; second grade manila, 7½c. to 8c. per pound; hardware grade, 7c. to 7½c. per pound; pure sisal of the highest grade, 6½c. per pound; second grade, 6c. per pound; rove jute rope, ¼-in. and up, No. 1, 6½c. to 7c. per pound; No. 2, 6c. to 6¼c. per pound.

Linseed Oil.—The market continues dull. Domestic raw is quoted in carloads from 87 to 88 cents per gallon, according to the seller. Foreign oil for immediate delivery is quoted at about 4 cents less per gallon. One reason given for the indifference manifested by manufacturing consumers is that such oils as fish and cotton seed oil, among others, which are known as nondrying oils, can by the discovery of processes of treating them be used successfully in replacing linseed oil. The following are New York prices in 5-barrel lots or more:

	Cents.
State, raw	91
City, raw	91

Oil in lots of less than 5 bbl., 1 cent advance per gallon.
Boiled oil, 1 cent advance per gallon over raw.

Naval Stores.—There has been a readjustment in prices of turpentine at Savannah, where receipts of the new crop are heavier. Prices have declined in New York and a further reduction is expected. Buying, as usual on a falling market, has been restricted to immediate requirements. New York turpentine quotations in 5-barrel lots are as follows:

	Cents.
In oil barrels	93½
In machine barrels	94

Less than 5-bbl. lots, ½ cent advance per gallon.

Rosins are lower in sympathy with the reduction at Southern points, which, however, has not increased demand in New York. On the basis of 280 lb. to the barrel, common to good strained is quoted at $8.15 and grade D at $8.30 in the New York market.

The writer of the communication on "Reciprocity" will please send his name to the editor of *The Iron Age*. It will be kept in confidence, but under our rule the communication cannot be printed unless we have the name of the author.

Frank Samuel, Philadelphia, Pa., was the highest bidder for the blast furnace plant of the Union Iron & Steel Company, Big Stone Gap, Va., at the receiver's sale April 6. If the sale is confirmed by the court the buyer will dismantle the plant.

Revised bids were taken Wednesday on about 2500 tons of steel for the new buildings of the Gary Screw & Bolt Company, Gary, Ind. This company has adopted steel for one or two large buildings which it had originally intended to build of concrete. The amount of steel to be used in the plant will therefore be much larger than called for in the original plans.

The Standard Gauge Steel Company, Beaver Falls, Pa., manufacturer of crank shafts, connecting rods, machine keys, machine racks and other finished steel specialties, has opened a branch office in the Old Colony Building, Chicago, in charge of John Gillen, and a branch office in the Pennsylvania Building, Philadelphia, in charge of W. A. Mellon.

Arthur R. Cruse, who severed his connection with the Cruse-Kemper Company on October 1, 1910, announces that he has established the Cruse Engineering Company, 1420 Chestnut street, Philadelphia. He will give attention to designing and contracting in gas holders, shell and tank work and general plate metal work; also structural steel for all uses.

Secretary of the Navy Meyer has retained H. L. Gantt, Harrington Emerson and Charles Day, experts in scientific management, to visit the principal Eastern navy yards, with a view to improving the methods in the manufacturing and repair shops. Some steps along these lines have already been taken, but it is found advisable to instruct the officers at the yards in the details.

The Charles Greiner Company, manufacturer of high speed elastic-blow riveting and spinning machines, wire straightening and cutting and special forming machines, New Haven, Conn., suffered the loss of its entire plant by fire April 8. It is arranging to resume operations speedily and believes that it will be able to do so within a week or two.

A creditors' committee has been appointed to take charge of the affairs of George W. Jackson, Inc., Chicago, to avoid bankruptcy proceedings if possible. The assets are estimated at $5,500,000 and the liabilities at $5,000,000. The cause of the company's financial difficulties is insufficient working capital.

The Flannery Bolt Company, Bridgeville, Pa., has placed an order with the Nazel Engineering & Machine Works, through its Pittsburgh representative, J. A. Smitmans, for two 770-lb. Beche pneumatic forge hammers, to be driven individually by 35-hp. Crocker-Wheeler motors.

The Ohio Iron & Steel Company, which has been considering the blowing in of its Mary Furnace, at Lowellville, Ohio, has decided to allow the stack to remain out of blast, owing to the unsatisfactory condition of the pig iron trade.

John E. Williams has been appointed receiver for the Scott Iron & Steel Company, Carnegie, Pa. The assets of the concern are given as $300,000, with current liabilities of $100,000 and bonded debts of $150,000.

The National Iron & Steel Company, 330 Chronicle Building, Houston, Texas, is distributing a photographic view of that portion of its old material yards showing the large quantity of relaying steel rails which it carries in stock.

The plant of the Hollidaysburg Iron & Nail Company, at Hollidaysburg, Pa., was sold March 11 to Gustave Benjamin, Buffalo, N. Y. The works are to be improved and enlarged and operations are to be resumed shortly.

New Tools and Appliances

This is essentially a news department for which information is invited.

A Variable Speed Countershaft for Ceilings.—The G. A. Gray Company, Cincinnati, Ohio, has brought out a new variable speed countershaft which gives four different cutting speeds with a constant high return speed. The essential part of the drive is two inversely placed cones, one mounted on the constant speed shaft carrying the return pulley, and the other on the variable speed shaft which carries the cutting pulley. The line shaft drives the constant speed shaft through a pair of tight and loose pulleys, and this shaft in turn drives the variable speed shaft through an endless belt. In changing speeds it is necessary to pull two cords. The first of these raises the swinging idler with which the countershaft is provided and slackens the belt, while the next movement increases or decreases the speed. The weight of the swinging idler keeps the endless belt under the required driving tension, and the momentum of the two cone pulleys supplementing that of the heavy flywheel pulley reduces the strain on the line shaft belt when the speed is reversed.

Engine and Turret Lathe Chucking Mechanism.—A novel chucking mechanism for use wherever work has to be chucked in reasonably large quantities in either the rough or the partly finished state has been developed by Adolph Muehlmatt, Cincinnati, Ohio. It can also be employed for handling castings and forgings or pieces cut from the bar and in use the work is placed in the chuck, gripped and machined and afterward removed without stopping the spindle. Cast iron split chucks hold the work and are actuated by a closing tube in the interior of the spindle, the tube itself deriving its movement from a lever conveniently located at the front or the rear end of the head, according to the type of machine to which the apparatus is applied. These chucks can be employed for either external or internal gripping and in both cases are operated through three rocker fingers, with wedge-shaped heels that act like a set of toggles against an adjustable collar at the rear end of the chucking tube. The operating fingers themselves are actuated by a sliding ring enveloping the rear end of the apparatus and provided with a helical cam slot which gives it an endwise movement when it is rotated upon its bearing shell. This ring is operated by a toothed sector that receives its motion from the operating handle. When this handle is pulled forward the chuck is closed upon the work and pushing it to the rear releases the piece after machining. When the chuck is gripped tight on the work the thrust of the closing tube is straight against the square ends of the chuck locking fingers, and the latter are locked in position and relieved of any tendency to open and put excessive friction upon the operating sleeve and other parts.

A 5-In. Self-Contained Motor Driven Cutting-Off Machine.—The Hurlbut-Rogers Machine Company, South Sudbury, Mass., has placed on the market a motor driven cutting-off and centering machine of the accelerated speed type. A short shaft under the main spindle, having a sliding gear at one end which meshes with one of the driving gears of the machine and a pulley that is belt connected to the shaft on top of the standards, drives the centering attachment which is mounted on a sliding base and pushes back out of the way when not in use. The spindle of this attachment is hollow and the work end has a standard taper fit with a chuck for holding drills and countersinks. A constant speed motor of any standard type can be used to drive the machine by having its armature shaft extended sufficiently to mount a pulley at each end for the belts running to the side pulleys of the machine.

Circular Milling Attachment.—The Hendey Machine Company, Torrington, Conn., has developed a new circular milling attachment, which is applicable to the maker's No. 3 or No. 4 machine. The attachment consists of a bracket carrying a universal shaft and driving a horizontal shaft for moving the table through a worm and worm wheel. The circular table worm shaft is driven from this horizontal shaft through bevel gearing, and the drive in either direction is controlled by a lever which also has a neutral position for use in turning the table by hand. The diameter of the table, which is provided with four T-slots, is 20 in. It is also graduated in degrees and has an additional T-slot for the trip dog, which can be set to stop the table at any point with the feed in either direction. The regular feed box of the machine is used and 21 circular feeds may be obtained. The attachment can be easily removed in a few minutes when not in use.

A Quick Return Boring Machine Feed.—A quick return for the cutter bar of its horizontal boring machine has been developed by the Cleveland Machine Tool Works, Cleveland, Ohio. This rapid rate of return is secured by pulling out the knob in the center of the feeding head and operating the capstan by hand. The clutch used also differs from those ordinarily employed, as the teeth are beveled to an angle just below the slipping point. This makes it a simple matter to engage or disengage the clutch, while at the same time it is not apt to unlock itself.

Double Action Drawing Press.—For deep sheet metal shells, such as automobile gas tanks, rapid fire cartridge shells, phonograph horns, deep and narrow seamless buckets and other work where the depth is great as compared with the diameter and the metal from which the shells are drawn is of light or medium weight, the Ferracute Machine Company, Bridgeton, N. J., has recently placed on the market a line of six double action drawing presses. The frame is of the straight line type and is cast solid and the columns are set close together to secure a minimum of spring when doing heavy work. Cams bearing on steel rollers running in bronze boxes drive down the outer ram, the cam shape being of the proper form to produce a dwell, while the plunger which has a crank motion derived from an eccentric in the middle of the cam shaft descends to the bottom of the stroke. The press has double gears and to equalize the torsional stress there are twin gears on the cam shaft. A spring bolster is furnished for the bed of the press by which certain portions of the bolster can be sprung up with wedge bolts, thus obviating the use of paper or sheet metal for blocking dies that do not draw evenly. The press is controlled by a friction clutch of large diameter, which enables the operator to start or stop the press at any portion of its stroke. The largest press of the six has a ram stroke of 10 in. and a plunger stroke of twice that length. The overall hight of the machine is 160 in., and the total weight, approximately, 21,000 lb.

New Rockford Miller.—A new milling machine which can be used for both vertical and horizontal milling and slotting is being built by the Rockford Milling Machine Company, Rockford, Ill. The vertical milling and the slotting attachments are driven by a sleeve or quill connected to the main spindle by spur gearing. Both of these attachments have large bases which are bolted to the column and when the machine is to be used for regular milling work the quill can be removed quickly and replaced by the overhanging arm. Sixteen spindle speed changes are available through a four-step cone pulley and double back gears, and 14 feed changes ranging from 0.005 to 0.21 in. per revolution of the spindle can also be secured. Handles located on the side of the column provide seven variations through a tumbler gear mechanism and the back gears double this number. The maximum longitudinal feed for the table is 24 in., the traverse travel is 7½ in. and the vertical movement below the center is 19 in.

Grinding and Polishing Machines.—The Webster & Perks Tool Company, Springfield, Ohio, has recently brought out a number of new tools and is completing its line of grinding and polishing machinery from the very smallest bench to the largest floor sizes. The new machines are now practically ready for the market and catalogues and other literature descriptive of them are in preparation.

Obituary

HENRY CRIBBEN

Henry Cribben, Chicago, for many years one of the most prominent men in the stove trade, died April 6, aged 77 years. He was born on the Isle of Man, and was brought to this country when a child, his parents locating at Rochester, N. Y., but both died when he was nine years old. Living with friends, he attended school until he was 16 years old, when he entered the foundry of Row, Bennett & Co., Rochester, and learned the trade of molder. At the breaking out of the Civil War he enlisted in the army, serving until discharged in 1865. Returning to Rochester he organized the Co-operative Foundry Company, for the manufacture of stoves, and became its manager, later opening a branch in Chicago. Purchasing the Chicago business from the company he started the firm of Cribben & Sexton. This firm developed a very large stove manufacturing business, and incorporated as the Cribben & Sexton Company, the presidency of which he held up to his decease. Mr. Cribben was deeply interested in organization movements for the promotion of the stove business. For 10 years he was president of the Stove Founders' National Defense Association, and also served for a term as president of the National Association of Stove Manufacturers. He leaves a widow, a daughter and two sons, William H. and Edward W. Cribben.

A tribute to Mr. Cribben was paid in shutting down the Pittston Stove Works, Pittston, Pa., by the present president, George Mitchell, of the Stove Founders' National Defense Association, on Monday afternoon, at the time of the funeral in Chicago. President Mitchell made an address covering the beneficent influence Mr. Cribben had exerted in the interest of the stove founder and stove molder.

TOM L. JOHNSON, who was Mayor of Cleveland, Ohio, from 1901 to 1909, died in that city April 10, aged 56 years. He had been a national figure for 10 years, chiefly by reason of his persistent campaign for 3-cent street railroad fares in Cleveland. In 1888, as a free trader and an advocate of Henry George's single tax, he ran for Congress in the Cleveland district and was defeated. In 1890 he was elected, and two years later he was re-elected by a large plurality in a Republican district. His first employment as a young man was with a street railroad company at Louisville, Ky. He later acquired an interest in an Indianapolis street railroad and at 22 years of age had a controlling interest in its stock. With his brother, Albert L. Johnson, he acquired interests in various street railroad systems, their largest operations being in Cleveland and in Brooklyn, N. Y. With A. J. Moxham he established the Johnson Company at Johnstown, Pa., in 1888, building a mill for rolling girder rails manufactured under patents of the company. The mills were removed to Lorain, Ohio, in 1895 and the Lorain Steel Company was organized, which later built blast furnaces in connection with the Bessemer steel plant at Lorain. Mr. Johnson was vice-president of the Johnson Company and of the Lorain Steel Company. The latter company was absorbed by the Federal Steel Company.

The Carnegie Steel Company has leased the fifth and sixth floors of the Frick Building, Pittsburgh, containing about 50 offices, and will connect the Carnegie Building, all of which it occupies, with the Frick Building by two bridges across Relief alley, which separates these two structures. Most of the former tenants on the fifth and sixth floors of the Frick Building have been transferred to other offices in the same building.

The Bessemer Gas Engine Company, Grove City, Pa., has received a contract from the Honolulu Consolidated Oil Company of California for eight 80-hp. gas engine driven compressors, together with lighting and pumping plant for the Pacific Coast Works. The same concern has recently received other heavy orders for its Bessemer gas engines and is running its shops practically full time.

Personal

Reuben Hill has been made factory manager of the Detroit Lubricator Company, Detroit, Mich.

R. W. Anderson, superintendent of the open hearth department of the Colorado Fuel & Iron Company, Pueblo, Colo., has resigned to take the position of superintendent of the open hearth department of the Pittsburgh Steel Company, Monessen, Pa., May 1.

C. A. Haney, president of the Sloan & Chace Mfg. Company, Newark, N. J., has returned from a trip to Cuba.

Henry J. Gosiger has severed his connection with the Eureka Foundry Company, and has entered the pig iron and coke business, having offices in the Gerke Building, Cincinnati.

George M. Houston has severed his connection with the Houston, Stanwood & Gamble Company, boiler and engine builder, Covington, Ky., to accept a position with the Root & Vandervort Engine Company, Moline, Ill.

C. H. Pearson, formerly with the Noera Mfg. Company, Waterbury, Conn., has accepted a position in the hoist department of the Yale & Towne Mfg. Company. His field of operations will be in the West.

W. L. Louis has been appointed traffic manager of the Elgin, Joliet & Eastern Railway Company, Chicago, succeeding F. E. Learned, who has resigned to engage in other business.

John G. Wright, New York manager for the Hooven-Owens-Rentschler Company, manufacturer of Corliss engines, Hamilton, Ohio, is on a business trip to Porto Rico.

W. H. Tew has acquired an interest in the Carpenter-Kerlin Gear & Machine Company, 77 White street, New York.

At a meeting of stockholders of the Riverside Bridge Company, Martins Ferry, Ohio, Albert Whitaker was elected a director to fill the vacancy caused by the death of his father, and Alexander Glass was elected to succeed Harrison Hibbis. The directors who were re-elected are O. R. Wood, F. J. Park, Henry Schmulbach and J. B. Summerville.

W. McLain of the sales department of the Cambria Steel Company, Oliver Building, Pittsburgh, Pa., has returned from a five weeks' trip to California.

W. L. Rodgers, president of the Pittsburgh Gage & Supply Company, Pittsburgh, and who last week was elected president of the National Supply and Machinery Dealers' Association, has gone to Bermuda.

M. H. March, formerly in charge of pig iron and coke sales for Frank Samuel, is now associated with J. K. Dimmick & Co., Philadelphia, Pa., in charge of pig iron sales.

Carlisle Mason, vice-president and general manager of the Nelson Valve Company, Wyndmoor, Pa., returned April 6, from an extended business trip abroad.

Howard Warner, who has for several years been connected with the office of Frank Samuel, Philadelphia, Pa., has been placed in charge of the pig iron and coke sales, succeeding H. S. March, resigned.

James Taylor has resigned as manager of the Belting & Machinery Company, Rochester, N. Y., to become sales manager for Charles M. Ghriskey's Sons, 508 Commerce street, Philadelphia, importers and jobbers of hardware and supplies.

D. P. Chase, superintendent of the New York Car Wheel Company, Buffalo, N. Y., has resigned his position with that company to accept the appointment of secretary with the Albany Car Wheel Company, resident in Albany, N. Y.

The J. W. Paxson Company, Philadelphia, Pa., announces that it is now ready to ship all grades of Albany and Lumberton molding sand, core sands, clay, &c., direct from the banks, opening the 1911 season, or can ship seasoned sands from its store sheds, in almost any desired quantity.

Recent Immigration

Its Significant Aspects to the Iron and Steel Industry

BY W. J. LAUCK.

One of the most interesting results of the remarkable expansion of the American iron and steel industry has been the constantly increasing demand for labor to operate the new blast furnaces and steel mills. An indication of the steady increase in the operating forces may be realized from the fact that the average number of iron and steel workers in the United States in 1880 was only 140,798, as compared with 171,181 in 1890 and 242,740 in 1905. The original employees of the industry were native Americans or representatives of immigrant races from Great Britain and northern Europe. A development similar to that in the iron and steel industry, however, was characteristic of the other basic industries of the country in the period under discussion, and with the general and constantly increasing demand for iron and steel workers, the original sources of labor supply were found inadequate. Recourse was therefore had by manufacturers to the immigrant labor supply from southern and eastern Europe, and the members of immigrant races from this geographical area soon found employment in considerable numbers in the furnaces and steel mills.

After 1895 the immigration of English, Irish, Scotch and German laborers practically ceased, and during the past 15 years the additional labor forces required by the iron and steel industry have been principally recruited from recent immigrant races. At the present time 57 per cent. of the entire operating force of the blast furnaces and steel mills is of foreign birth, principally English, Irish, Welsh, German, and such races of southern and eastern Europe as Croatian, north and south Italian, Lithuanian, Magyar, Polish, Russian, Roumanian, Servian, and Slovak. The recent immigrants preponderate among the foreign born employees.

The extensive employment of such large numbers of immigrant workmen of many races was obviously followed by many important results, both from the standpoint of the industry itself, its processes and method of organization, and from the point of view also of the original operating forces. Before these results may be fully realized, however, it is necessary to review briefly the personal and industrial characterictics of the southern and eastern Europeans, who were employed in such large numbers.

Characteristics of Southern and Eastern Europeans

From a strictly industrial standpoint, one of the facts of greatest import relative to the new arrivals has been that an exceedingly small proportion have had any training or experience while abroad for the occupations in which they have found employment in iron and steel plants in this country. The bulk of recent immigration has been drawn from the agricultural classes. In this respect they afford a striking contrast to the steel workers of past years from Great Britain and northern Europe, who were usually skilled industrial workers before coming to the United States and who sought positions in this country similar to those which they had occupied abroad.

In addition to lack of industrial training and experience, the new immigrant labor supply has been found to possess but small resources from which to develop industrial efficiency and advancement. The southern and eastern Europeans have, as a rule, given evidence of industry and energy, but, unlike the races of older immigration, they have been unable to use the English language, and a large proportion have been illiterate.

The standards of living of the iron and steel workers from the south and east of Europe have also been low. The recent immigrant males being usually single, or, if married, having left their wives abroad, have been able to adopt in large measure a group instead of a family living arrangement, and thereby to reduce their cost of living to a point far below that of the American or older immigrant in the same industry or the same level of occupations.

Their Method of Living

The method of living usually followed is that commonly known as the "boarding-boss" system. Under this arrangement a married immigrant or his wife or a single man constitutes the head of the household, which, in addition to the family of the head, will usually be made up of from 2 to 16 boarders or lodgers. Each lodger pays the boarding boss a fixed sum, ordinarily from $2 to $3 each month, for lodging, cooking and washing, the food being usually bought by the boarding boss and its cost shared equally by each individual member of the group. Another frequent arrangement is for each member of the household to purchase his own food and have it cooked separately. Under this general method of living, however, which prevails among the greater proportion of the immigrant households, the entire outlay for necessary living expenses of each adult member ranges from $9 to $15 each month. The additional expenditures of the recent immigrant wage earners are small. Every effort is made to save as much as possible. The entire life interest and activity of the average wage earner from southern and eastern Europe seem to revolve about three points: (1) to earn the largest possible amount under the existing conditions of work; (2) to live upon the basis of minimum cheapness, and (3) to save as much as possible. Domestic economy, as well as all living arrangements, has been subordinated to the desire to reduce the cost of living to its lowest level.

Another salient quality of recent immigrants who have sought work in the steel industry has been that as a whole they have manifested but a small degree of permanent interest in their employment or in the industry. They have constituted a mobile, migratory class, constrained mainly by their economic interest. They move readily from place to place, according to changes in working conditions or fluctuations in the demand for labor. The recent immigrant has no property or other restraining interests which attach him to a community.

Usually Tractable

To the above described characteristics of immigrant iron and steel workers of recent arrival should be added one other. The members of the larger number of races of recent entrance to the mills have usually been tractable and easily managed. This quality seems to be a temperamental one, acquired through present or past conditions of life in their native lands. When aroused by strikes or other industrial dissensions, the Slavic races have displayed an inclination to follow their leaders to any length, often to the point of extreme violence and disorder, but in the normal life of the mills the southern and eastern Europeans have exhibited a pronounced tendency toward being easily managed by employers. This characteristic, while strong, is confined, however, to the immigrant wage earners of comparatively short residence, and results from their lack of training and experience abroad and to the difference between their standards and aspirations and those of the native American and older immigrant industrial workers.

When the foregoing characteristics are considered it is somewhat surprising that the iron and steel manufacturer found it possible to utilize the recent immigrant labor force in any effective way. As a matter of fact, the extensive employment of the southern and eastern European was made possible only by the use of improved processes and methods, which have cut down the neces-

sary working forces of the industry as a whole and eliminated to a large extent the elements of mechanical skill and training formerly required. As a result it is possible to operate the mines, furnaces and steel plants with a much smaller proportion of skilled and specialized employees.

Another effect discernible from the extensive employment of recent immigrants has been the increase in the number of petty foremen. This situation might naturally be expected, because the immigrant wage earners from the south and east of Europe cannot speak English and require a greater amount of supervision than the native Americans and the older immigrants from Great Britain. As a matter of fact, such foremen in most instances are straw bosses and their main function is that of an interpreter. The body of non-English speaking employees are subdivided into small groups and placed under their direction in order to secure more ease in handling and a greater degree of efficiency.

Greater Liability to Accidents and Disease

From what has already been stated relative to the lack of industrial experience of the larger proportion of recent immigrant iron and steel workers, it is also clear that their employment has increased the liability to accidents and to disease. This situation is due to ignorance on the part of southern and eastern European wage earners, to their tendency to accept blindly dangerous working conditions, and to their lack of knowledge of safety devices and proper methods of precaution. Their ignorance also leads them to neglect the sanitary rules which have been formulated for the protection of themselves and their fellow workmen. In other words, when the lack of training of the recent immigrant while abroad is considered in connection with the fact that he becomes an iron and steel worker immediately upon his arrival in this country, and when it is recalled that a large proportion of the new arrivals are not only illiterate and unable to read any precautionary notices posted around the furnaces and steel mills, but also unable to understand English and consequently without ability to comprehend verbal instructions intelligently, the inference is plain that a direct casual relation exists between the employment of recent immigrants and the occurrence of fatalities and accidents.

Racial Displacements

As regards the effect of the employment of recent immigrants upon the native American and older immigrant employees from Great Britain, Germany and northern Europe, three distinct tendencies in the way of racial displacements and substitutions are plainly observable. In the first place, a large proportion of the native Americans, Welsh, English, Irish and Germans, who were exclusively employed before the advent of the southern and eastern Europeans, have voluntarily or involuntarily left the iron and steel industry.

In the second place, the older employees who remained in the industry were, as a rule, advanced to the skilled and responsible positions which require experience and training. Although improvements in methods of production caused a decline in the demand for skilled men, this situation was more than counterbalanced by the demand for trained steel workers growing out of the remarkable development of the industry. As a consequence, at the present time there is a sharp segregation into occupations according to races. The rough and unskilled work is done by the southern and eastern European immigrant. The skilled occupations and the executive positions are occupied by native Americans and by Welsh, English, Irish, Scotch, Germans and Scandinavians of the first or second generation.

In the third place, probably the most significant aspect in the present situation is found in the fact that the sons of native Americans and older immigrant employees from Great Britain and northern Europe are not in any considerable numbers seeking employment in the iron and steel manufacturing establishments. The superintendents of furnaces and mills in all sections of the country make complaint of this condition of affairs. It is ascribed by them to the tendency among native born persons to adopt a more or less superficial attitude and to seek after occupations of more conventional respectability. Whatever may be the cause of the reluctance of the native American to enter the steel mills, it is true that, for some time to come, efficiency must be sought by the manufacturers in mechanical inventions and in other economics rather than in a highly developed labor force.

Views of Employers

The United States Immigration Commission, in the course of its study of the iron and steel industry, endeavored to secure opinions from representative employers relative to the efficiency of the immigrant labor supply and a statement of their preferences for the different races of foreign born wage earners. The statements could only be obtained in a general way, since in the cases of particular kinds of work their opinions of the relative efficiency of the races employed had not been narrowed down to the point of differentiation. As a whole, however, they agreed on practically all comparisons given, which may be summarized thus:

1. Natives are considered superior to all races for executive positions, from the labor bosses up.

2. In all skilled occupations the preferences are stated to be for native labor first, and English, Welsh, Scotch, Swedes, Germans and Irish in the order named. No preferences as to the other races are stated, since the number in skilled work is too small to admit of comparison.

3. In unskilled work the native Americans, English, Irish, Welsh, Scotch, Germans and Swedes are employed at present to such a slight extent that relative preference cannot be stated. In all instances these races are the preferences over all others in unskilled labor. With regard to the southern and eastern European races themselves, the preferences of the employers are given in about the following order: Slovaks, Poles, Magyars, Croatians, Italians. The first three races named are regarded as nearly equal from the standpoint of preference, the Croatians as unsatisfactory, and the south Italians as the very last resort for any kind of labor except railroad construction.

The statements of employers regarding the efficiency of the second generation, including immigrants who had come to the United States during childhood, were that it was invariably greater than that of the first generation except when the latter had been experienced workers in their occupations before immigration, as in the case of Welsh. Chief among the reasons assigned for this opinion was the belief that the second generation is more ambitious and alert and, with the high degree of assimilation attained, a greater capacity for progress and efficiency is shown. In every case the second generation is regarded by employers with high approbation, and it is stated that there will gradually be afforded as the new generation grew up a supply of labor for the semi-skilled and skilled occupations, which will greatly aid in solving the conditions of scarcity.

Effect on Labor Organizations

The extensive employment of the recent immigrant is also largely responsible for the weakening and demoralization of the labor organizations of the original employees. It is not, of course, true that the recent immigrant caused the downfall of the unions of the early operatives in the industry. The significant fact, however, has been that the influx of recent immigrants has been too rapid and has occurred within too short a period of time to permit of their absorption by the labor organizations. As a consequence, they practically inundated the unions and hastened their disintegration.

There are no direct data available relative to the effect of the employment of recent immigrants upon wages and hours of work. It is true that wages have increased within recent years and, on the other hand, that there has been no decrease in the hours of labor. There cannot be much doubt, however, that the remarkable expansion in the iron and steel industry would have been marked by higher rates of wages and shorter hours had it not been for the availability of the labor supply from the south and east of Europe.

From a more general standpoint, the rapid increase of southern and eastern European iron and steel workers within recent years has been the cause of serious municipal and social problems. In the older steel manufacturing centers the extensive employment of recent immigrants has led to the development of isolated foreign colonies, which have been characterized by low standards of living, bad sanitary conditions, and which, because of the maintenance of old world customs and institutions and the indifference of the American population, have retarded progress toward industrial efficiency and general assimilation. Steelton, an industrial suburb of Harrisburg; Cambria City and Conemaugh, the foreign sections of Johnstown, Pa., and the immigrant colonies of Pittsburgh and its environs, Youngstown, South Chicago, Cleveland and Milwaukee, are all illustrations of the affixing, by a gradual process of industrial expansion, of immigrant sections to the original native American and older immigrant populations of steel manufacturing cities and towns. In other cases, such as Gary, Ind.; Lackawanna City, N. Y., and Granite City and Madison, Ill., the development of the iron and steel industry within recent years has created entirely new industrial communities composed almost wholly of southern and eastern European wage earners. Both classes of colonies present many difficulties in the way of absorbing and Americanizing the alien peoples who have sought work in the iron and steel industry.

Railroad Equipment Orders.—The Bethlehem Steel Company has ordered 100 steel coke cars from the American Car & Foundry Company; the Rock Island, 41 combination and postal cars from the Pullman Company; the Canadian Northern, 200 steel underframe cars from the Canadian Car & Foundry Company; the Birmingham & Southern, 100 freight cars from the Pressed Steel Car Company; the Inter-Colonial, 91 freight cars from the Canadian Car & Foundry Company; the Great Northern, 35 baggage and combination cars from the Barney & Smith Car Company; the Minnesota, Dakota & Western, 50 flat cars from the Haskell & Barker Car Company; the Bingham & Garfield, 120 dump cars from the Pressed Steel Car Company. The Chicago, Burlington & Quincy is still in the market for 1000 gondola cars and the Pittsburgh & Lake Erie for 1000 gondola cars and 1000 hopper cars. The Charlotte Harbor & Northern is in the market for 50 cars. The Seaboard Air Line is inquiring for 1000 steel underframe box cars and 200 phosphate cars. The Chino Copper Company is reported in the market for 50 hopper cars. The Missouri, Kansas & Texas is in the market for 16 locomotives. The Georgia Railroad has ordered 6 locomotives from the Baldwin Locomotive Works; the Lackawanna, 35 locomotives, and the Illinois Central, 5 locomotives from the American Locomotive Company. The Pere Marquette and the Western Maryland are reported in the market for a considerable number of locomotives.

M. J. Butler, vice-president and general manager of the Dominion Steel Corporation, gives this summary of recently completed and pending improvements at the plant at Sydney, Nova Scotia: During the past year 120 by-product coke ovens of the latest and most approved type, with a capacity of 720 tons per day, at an expenditure of $1,300,000, have been completed. Under construction and nearing completion are two 50-ton open hearth furnaces, one Bessemer converter and No. 8 blast furnace. A contract has been let for the superstructure of No. 7 blast furnace, and the work of excavation is now under way. A merchant mill for the manufacturing of bars, rods, &c., is being erected. There is on hand, ready to erect, as soon as the buildings are ready, a 22-in. mill for the manufacture of shapes, angle bars, &c.; also a plate mill.

The Foremen's Club of the Park Drop Forge Company, Cleveland, Ohio, held its quarterly banquet at the Gilsey Hotel on the evening of April 8. Thirty-one covers were laid. After the tables were cleared the guest of the evening, R. R. Abbott, metallurgist and chief engineer Peerless Motor Car Company, gave an illustrated address on "The Heat Treatment of Steel," which was greatly enjoyed. The Park Drop Forge Company is one of the largest drop forgers of alloy steel, crank shaft, axle and gear work in the country, and the quarterly banquets provide a pleasant way of securing scientific information.

The Osborn Mfg. Company Buys the American Wire Brush Company.—The Osborn Mfg. Company, Cleveland, Ohio, has purchased the business and patents of the American Wire Brush Company, 277 Greenwich street, New York, and will hereafter manufacture the products formerly made by that company in a new plant, which will also be Eastern district sales office for the products of the Cleveland plant, and will be located at 202 and 204 Center street, opposite Howard street, New York. The products taken over by the purchase by the Osborn Company include the Minerva line of wire brushes and the Mez wire wheel brushes. The New York plant and district sales office of the Osborn Company will be in charge of F. D. Jacobs, second vice-president, who will look after the sales in New York City and vicinity and New England, having been in close personal touch with the trade in that territory for the past 15 years. To provide additional capital for taking over the New York plant, the Osborn Mfg. Company has increased its capital stock from $100,000 to $200,000.

The Famous Danbury Hat Boycott Suit to Be Retried.—The United States Circuit Court of Appeals has ordered a new trial of the suit which was brought several years ago in the United States Court of Connecticut by D. E. Loewe & Co. against the United Hatters of North America. In the lower court the trial judge directed a verdict for the plaintiff and multiplied by three the amount of damages awarded by the jury. The trebling of the verdict was done under the provisions of the Sherman anti-trust law and this made a total judgment of $232,240.12. The Court of Appeals declares that the judge erred in directing a verdict and also states that hearsay evidence was improperly admitted.

The Cornell Economizer Company, 55 De Long Building, Philadelphia, Pa., has brought out a chart for determining the flow of steam through an orifice. The chart consists of two circular pieces of cardboard which are mounted concentrically and are free to move with respect to each other. The circumference of the outer piece is graduated to indicate the amount of steam discharged in pounds per hour, while the inner one has graduations corresponding to different diameters of orifice from ½ to 2 in. A portion of the circumference of the smaller piece is cut away so as to expose a series of graduations corresponding to the gauge pressure in pounds per square inch on the larger circle. There is a line marked G on the smaller circle which when set opposite the gauge pressure causes the graduation corresponding to the diameter of the orifice in inches to coincide with that indicating the amount of steam discharged in pounds per hour. This chart will be found accurate for the flow of steam through an orifice from a higher into a lower pressure when the ratio between the two sides does not exceed 58 per cent.

The American Blower Company, Detroit, Mich., has appointed the American Trading Company, Johannesburg, South Africa, as selling agent for its products in South Africa, and will conduct a more active campaign for business in that territory than heretofore. A good demand comes from South Africa for equipment for mine ventilation, this business being largely divided among American, German and English manufacturers of ventilating machinery.

The Atlanta & Carolina Railway Company, Atlanta, Ga., has awarded contracts to John T. Adams and L. E. Strum, Columbus, Ohio, for the construction of a standard gauge main line railroad and branches between Atlanta and Augusta, Ga., approximating 208 miles of construction.

The National Metal Trades Association

The thirteenth annual convention of the National Metal Trades Association opened at Hotel Astor, New York, Wednesday morning, April 12. The attendance was large at the first session, with a promise of even a greater gathering for the second day. The reports of President J. H. Schwacke and Commissioner Robert Wuest demonstrated that the association has had a very successful year, and is in a most prosperous condition. Fred A. Geier, chairman of the Committee on Industrial Education, presented a very able report, containing important data, and recommending an organized effort to further this most important branch of education, which would mean the employment of an "evangelist," to use the expression applied in the paper and the discussion which followed it. The idea received enthusiastic indorsement.

The usual convention committees were appointed. The Committee on Resolutions is as follows:

H. D. Sharpe, chairman, Brown & Sharpe Mfg. Company, Providence, R. I.
H. W. Hoyt, Great Lakes Engineering Works, Detroit, Mich.
B. Briscoe, United States Motor Company, Tarrytown, N. Y.
H. N. Covell, Lidgerwood Mfg. Company, Brooklyn, N. Y.
Harry B. Kennedy, Hoggson & Pettis Mfg. Company, New Haven, Conn.

The annual dinner of the Alumni, consisting of past and present officers, was held at the Hotel Astor on Monday evening.

Buffalo Coke Rates Hearing.—An adjourned hearing on the coke freight rate advance from the Connellsville district to Buffalo was held before Special Examiner J. Edgar Smith of the Interstate Commerce Commission staff at Buffalo, April 10. Additional arguments against the advance were presented by the complainants. Briefs of these arguments will be forwarded to the commission at Washington for decision. The complainants are the Wickwire Steel Company, Buffalo Union Furnace Company, Tonawanda Iron & Steel Company, New York State Steel Company and Lackawanna Steel Company. The railroads involved as defendants are the New York Central, the Buffalo, Rochester & Pittsburgh; the New York, Chicago & St. Louis; the Lake Shore & Michigan Southern, the Pittsburgh & Lake Erie, the Baltimore & Ohio, and the Pennsylvania.

The Quebec Bridge Contract.—The Canadian Government has contracted with the St. Lawrence Bridge Company to build the Quebec bridge, the cost to be $8,650,000. It will be a railroad bridge with two 4-ft. sidewalks. The original design providing for roadways and street railroad lines has been abandoned.

Fire seriously damaged the south pipe foundry of the Camden Iron Works, R. D. Wood & Co., Camden, N. J., April 6. The roof was burned through but did not fall, thereby saving what might have been a heavy loss from damaged machinery and equipment. This department will be idle several weeks for repairs, but a good share of the work will be taken care of in other departments of the plant. The loss is estimated at $15,000.

Fred F. Fischer, manufacturers' representative, has removed his office from the Park Building to 703 Oliver Building, Pittsburgh. Mr. Fischer represents the following in the Pittsburgh district: Providence Engineering Works, Providence, R. I.; De LaVergne Machine Company, New York; Trenton Engine Company, Trenton, N. J.; Hawkes Boiler Works, Chicago. Mr. Fischer's specialty is installing fas engines and gas producers, using Lard or soft coal for fuel.

The Titusville Iron Company has removed its offices in the West Street Building, 90 West street, New York, to room 1307. Barnard Abel, who for many years has been general manager at the works, will have personal charge of this office.

British Trade Conditions Less Favorable

A less hopeful view is taken by iron trade journals in London of the outlook both in pig iron and finished material. The *Iron and Coal Trades Review* says that the pig iron position is discouraging. Production exceeds demand, especially in the Cleveland district, and the prospect for exports to the Continent is not so bright. Cleveland warrants have declined to 47 shillings 1½ pence. Iron in Connal's stores March 30 amounted to 626,821 tons, against 451,448 tons March 31, 1910. The finished iron and steel trades have grown quieter. In the Midlands the market was adversely affected by the financial difficulties of a large firm of bar manufacturers. The galvanized sheet trade is less active, exports being considerably less than at the same time last year. Steel shipbuilding material shows a fair demand, and in the north of England ship plates are still at £6 15s.

The *Ironmonger* says that the chief event of the last week of March was the prolongation of the Rail Trade Association, the difficulties recently encountered being surmounted. It is stated that the negotiations for putting the Tube Manufacturers' Association on a better basis have been broken off for the time being. This journal says concerning exports from the United States:

> There is still a continual outflow of half-finished steel from the United States to Europe, among the latest shipments being 500 tons of billets by the Manchester Importer from New York to Manchester, which steamer also carries 700 tons of pig iron and 144 tons of steel bars, while the Quernmore, from Baltimore to Liverpool, carries 2020 tons of billets. The large increase noted lately in the imports of semifinished steel into South Wales is affecting the local steel manufacturers, the Dowlais Works lately having been making only four days a week, while there are complaints that a somewhat similar state of affairs prevails at some of the other establishments in the district. The imports of sheet bars are increasing, too, just at a time when the galvanized sheet trade is in anything but a prosperous condition, and when for the time being at all events the tin plate manufacturers are not quite so well off for specifications as they would like to be. Some makers seem to have been rather saving up plates of oil sizes, apparently hoping that the Standard Oil Company would come into the market here and take up any material available. Unfortunately, however, as it happens, the Standard Oil requirements are being executed on the other side of the Atlantic, and the reflex action set up tends temporarily to weaken the situation in Wales.

The Jones & Laughlin Steel Company, Pittsburgh, has placed an order with the Alliance Machine Company, Alliance, Ohio, for three three-motor electric traveling cranes—one 5-ton, with a 77-ft. span; one 10-ton, with a 77-ft. span, and one 15-ton, with a 122-ft. span—for installation in the new billet mill at its Aliquippa, Pa., plant. The Carnegie Steel Company has placed an order with the same company for a three-motor 10-ton crane with a 54-ft. span, to be installed at Homestead, Pa.

The Detroit Seamless Steel Tubes Company, Detroit, Mich., established for itself a new production record in the month of March, its output having been 24 per cent. larger than in any previous month in its history. A large percentage of the production of this company is used by the railroads for locomotive flues. The product for the month of March, if placed end to end, would represent a tube about 175 miles long.

The Pittsburgh Machine Tool Company, which is building a new plant at Braddock, Pa., expects to occupy it about May 1. The new building is brick and covers an area of about 100 x 217 ft. Some equipment has been installed, including a 10-ton crane purchased from the Cleveland Crane & Engineering Company. The new plant is expected to double the company's present capacity.

The offices of William Swindell & Brothers, engineers and contractors, have been removed from the German National Bank Building to suite 5034-5037 in the new Jenkins Arcade Building, Fifth avenue and Liberty street, Pittsburgh, Pa.

The Vanadium-Alloys Steel Company, Latrobe, Pa., has increased its capital stock from $200,000 to $300,000.

Efficiency Methods of the Tabor Mfg. Company

Results of the Introduction of the Taylor System of Scientific Management

An important paper, presented before the Congress of Technology in Boston, April 11, at the fiftieth anniversary of the granting of the charter of the Massachusetts Institute of Technology, was that of Wilfred Lewis, president of the Tabor Mfg. Company, Philadelphia, entitled "An Object Lesson in Efficiency." In the introductory pages of the paper Mr. Lewis reviews conditions existing before the Taylor system of scientific management was introduced. The author, after a long career as a mechanical engineer with William Sellers & Co., became an officer of the Tabor Mfg. Company 11 years ago, the business being the manufacture and sale of foundry molding machines. At first the machines were built on contract. Later the company established its own plant in Philadelphia. Mr. Lewis tells of the advice given by his friends to maintain an open shop and to keep down the number of clerks or nonproducers. The need of better shop management was not appreciated until the growing business began to show increasing losses. Within a year came a general strike for higher wages and shorter hours. This was compromised by the concession of shorter hours at the same pay. The company sold more of its stock and borrowed more money until it seemed unreasonable to expect further financial aid.

At this juncture Fred. W. Taylor offered to loan the company more money if it would install his system of management. This arrangement was made and the initiation of the new system was put in charge of Carl G. Barth. There was much criticism at the start, and this was not confined to the shop. Mr. Barth was obliged to call for more and more assistance in the planning department, and for a year or two it seemed as though ground was being lost. At length, however, the work begun by Mr. Barth and continued by Mr. Hathaway, now vice-president of the company, began to bear fruit. Instead of losses there was an even break, and then profits. A better spirit prevailed, better wages were earned and production increased rapidly. Mr. Lewis, after giving in detail the history summarized above, asks the question, "How comes it that a large increase in the force of nonproducers can be made to effect such an enormous increase in output?" In answering it he gives the following details of the operation of the Taylor system in the Tabor plant:

"In 1910 the Tabor Mfg. Company turned out two and one-half times as much value in finished product as it ever did under the old régime with the same force. Formerly for every 10 men engaged as producers, or 'chipmakers,' as Mr. Dodge defines them, we had not more than one man connected with the shop as a nonproducer. Now we have fewer men at machines, with three times as many nonproducers turning out practically three times as much work, because prices are lower to-day than they were five or six years ago, and two and one-half times the value means about three times the product.

"To explain in detail these anomalous results would carry me far beyond the limits of my paper and call for the elucidation of a system which had better be studied at first hands."

It is not an easy matter to start any innovation in an open shop full of union men, and, as might be anticipated, the appearance of a man with a stop watch and tally sheet was at first strenuously opposed by the workmen. So also was the suggestion of a bonus for the successful performance of an allotted task. But the kickers were gradually converted or discouraged, better discipline was established, and a few of the men were soon earning 30 per cent. more wages than they could command elsewhere.

Rates Not Changed and Men Are Not Driven

In the beginning the men were suspicious and disinclined to believe that a good performance was not to be the signal for a cut in price; but they have since learned by experience that prices are fixed by the management upon definite knowledge of all the time elements involved in any piece of work, and that the time allowed will not be changed so long as the method employed remains the same. In this way the management demonstrates its loyalty to the workmen and they in turn are glad of an opportunity to demonstrate their loyalty to the management, as they did last year.

We pay better wages for fuller and better results performed in a definite way, and yet there is no driving in the ordinary sense of the word. The tasks assigned to the workmen are easily within their ability to perform, and when new work is given out, as occasionally happens, at day rates, before the time on the job has been set, nobody wants to take it because there is no bonus attached for its quick and accurate performance.

Functional Foremen Important Factors

But our wonderful increase in production is not due entirely to rapidity of performance, for in some instances very little gain in that direction has been made. A great deal is due to the functional foremen, whose duty it is to prepare and guide the way of every piece of work going through the shop. The old notion that a man cannot serve two masters or take orders from more than one superior is denied by the new philosophy, which makes it possible for a workman to have as many bosses as there are functions to be performed. There is no conflict of authority unless the functions overlap, and even there such conflict as may arise is salutary and to the interest of the company. A gang boss, for instance, covers one class of machines or work, and it is his business to see that every man is provided with at least one new job, with all the tools and fixtures, ready for its immediate performance as soon as the job upon which he is engaged has been completed. He also gives the necessary instructions about setting the work, explains the drawings and teaches the workman how to set his work when necessary. This man has nothing to do with the running of machines and does not interfere at all with the speed boss, who also has supervision in his function over the same men as the gang boss and sees that each machine is run at its proper speed, with feed and cut as per written instructions. He also teaches the workman and gives him such practical assistance as may be needed.

An inspector also helps the same set of men and sees that the work done is of the right quality, and that the first piece made is up to the standard in all dimensions, fit and finish. He also makes further inspection from time to time to see that the standard is maintained. An overzealous speed boss in his desire for a large output may impair the quality of the work done by exceeding the speed limit, and there is, therefore, the possibility of a conflict between the speed boss and the inspector, but the inspector's requirements must be fulfilled, and such a conflict cannot fail to be salutary, because rapidity of production when accompanied by inferior results is never to be desired, and in almost all cases some method is found by which high speed can be maintained and the best quality preserved. It rarely happens that the superintendent or manager is called upon to adjust a difficulty between the two functional foremen.

The Stockkeeper's Contribution

In assembling the various parts required to make a complete machine the stockkeeper sees that all the parts for a group of machines are in hand ready to go together before work is begun upon any one of them, and the whole group is finished at the same time.

To avoid delays incident to materials which should be ordered in advance, the storeroom must carry a sufficient amount of stock to cover the time required for replacements, and this is cared for by a storekeeper and his clerical assistants in an automatic, mechanical way. For-

merly it was necessary for the superintendent to bear in mind or to look ahead and see what was wanted in advance; but with many thousand parts going through the shop at once, important details, sometimes few and sometimes many, were invariably overlooked, which meant delay and disappointment to the customer and very often cancellation of orders. Now a balance of stores is kept in the planning department by which new orders are placed as soon as the stock on hand falls below a certain established minimum, kept plainly in view against every detail. This minimum may vary as conditions change, and it is fixed by the discretion of the manager of the planning department in consultation with the sales department.

Planning the Work

In the planning department, which is to the shop what the drawing room has been for many years to the superintendent, every new machine is charted to show the progress of the work through the shop, and every piece is provided with an instruction card for its proper manipulation, showing the machine upon which it is to be done, the tools and fixtures required, the feeds and speeds to be used, the sequence of operations and the time allowed in detail for each and every elementary movement. As these operations are performed they are checked off in a route file, from which can be seen at any time the exact condition of the work and the time remaining for its completion.

An order of work clerk directs the progress of the orders to be filled in accordance with a schedule prepared by the manager in consultation with the sales department, and he has before him in miniature a view of the whole shop, showing every machine or vise, the work being done on each, the work ready to be done and the work ahead in the shop which has not yet arrived at the machine. This is a large board or wall plate, which shows also what machines are manned and where a man can be conveniently shifted when there is no work ahead at his particular machine. By this means all of the work in the shop is kept moving in proper balance at a normal rate of speed, men are taken on or laid off as the exigencies of business may require, and no loss is sustained by the usual tendency of workmen to relax when, in times like these, orders are falling off and work ahead is hard to find. At such times we are, of course, obliged to curtail production, and the situation being apparent to all, no complaint is made against a reduction in time, which we always prefer to a loss of well trained men.

A well equipped toolroom in charge of a competent man is a *sine qua non* in any machine shop, and here also one of our greatest improvements has been made. Formerly each workman was inclined to accumulate his own assortment of tools and fixtures, which were stowed away in dark corners and kept in disorder and confusion. Now everything comes in perfect order (and the best of its kind) from the toolroom as required and goes back again when the job for which it was taken out is finished. Tools are ground to standard forms and not to suit the whims of individual workmen, and the toolroom is responsible for the condition of all tools sent out.

No Time Study in Designing

The drawing room is, perhaps, of all departments less affected by the new order of things than any other, and yet there is an indirect effect due to the atmosphere of activity which pervades the whole plant. Here the work is by its very nature more or less original and, of course, no time can be set for the completion of that which is not definitely known, and which grows into shape by a process of trial and error, until something satisfactory is attained. Designing is not therefore amenable to time study, and depending largely, as it does, upon inspiration, there is no superior intelligence to direct its progress. It is the nature of original research which flourishes and bears its best fruit under adverse criticism. A good designer is like a good composer. His work is creative and full of harmonies, and, being an artist in his line, he cannot be held to a time schedule. In original work the incentive therefore must come from within rather than from without, and this is generally inborn with the ability to create. Copyists, on the other hand, who always need direction, might be brought under the domination of time study, and in many clerical operations this has been done, but we have not yet attempted to fix tasks in tracing or bookkeeping and we do not pretend to say that our development is by any means complete. We have progressed, however, to a point which makes further progress comparatively easy, and in the face of stubborn opposition we have firmly established a successful business upon the principles of scientific management as laid down by Dr. Taylor.

The scientific habit of thought as applied by Dr. Taylor to the production of high speed steel has resulted in speeding up machine shops about three to one, and I think it is not unreasonable to expect that the same habit of thought as applied by him to the every day hand work of men will eventually result in doubling the average output of labor with comparatively little increase in the physical effort required.

Papers for the Foundrymen's Convention

The secretary, Dr. Richard Moldenke, Watchung, N. J., announces the following provisional list of papers to be read at the convention of the American Foundrymen's Association at Pittsburgh in the week beginning May 22:

"Economical Insurance for Foundry Properties," by S. G. Walker, Providence, R. I.
"Foundry Construction," by Geo. K. Hooper, New York City.
"Vanadium Iron and Steel Castings," by G. L. Norris, Pittsburgh, Pa.
"The Foundry at Close Range," by Benj. D. Fuller, Cleveland, Ohio.
"The Permanent Mold," by Edgar A. Custer, Philadelphia, Pa.
"Titanium in Iron and Steel Castings," by Chas. V. Slocum, Pittsburgh, Pa.
"Production Costs," by Ellsworth M. Taylor, New York City.
"The Manufacture and Annealing of Converter Steel Castings," by Bradley Stoughton, New York City.
"The Electric Steel Furnace for Steel Castings," by Dr. P. Heroult, New York.
"Titanium in Malleable," by C. N. Gale, Pittsburgh.
"The Practicability of the Induction Furnace for the Making of Steel Castings," by C. H. Von Baur, New York City.
"The Rotary Blower for Cupola Use," by R. H. Rice, Schenectady, N. Y.
"Open Hearth Steel Foundry Practice," by R. E. Bull, Granite City, Ill.
"Pattern Shop Apprentices," by Jabez Nall, Cleveland, Ohio.
"The Application of Lifting Magnets to Foundry Work," by A. C. Eastwood, Cleveland, Ohio.
"Electric Motor Drive for Foundries," by Brent Wiley, Pittsburgh, Pa.
"The Small Open Hearth Furnace for Steel Castings," by Walter MacGreggor, Chicago.
"Microscopic Structure of Iron and Steel," by Prof. William Campbell, New York City.
"Manganese and Silicon in the Foundry," by A. E. Outerbridge, Jr., Philadelphia, Pa.
"Gas Cavities, Shot and Chilled Iron in Iron Castings," by Thos. D. West, Cleveland, Ohio.
"Core Making and Core Machines," by Arch. M. Loudon, Elmira, N. Y.
"Molding Machine Practice," by E. H. Mumford, New York City.
"Machine versus Hand Molding," by John Alexander, Philadelphia, Pa.
"Defective Castings and How to Handle Them," by John M. Perkins, Detroit, Mich.
"Core Room Practice," by F. A. Coleman, Cleveland, Ohio.
"Cupola Melting Practice," by P. Munnoch, New York City.
"Malleable Castings," by W. P. Putnam, Detroit, Mich.
"The Equipment of Air Furnaces Using Oil as Fuel," by N. W. Best, New York City.
"Instruction Paper on Phosphorus in Cast Iron," by H. E. Field, Pittsburgh, Pa.
"Mechanical Charging of Cupolas," by G. R. Brandon, Harvey, Ill.
"Pattern Equipment," by W. S. Giele, Philadelphia, Pa.
"Recovery of Foundry Waste," by S. A. Capron, Westfield, Mass.
"Cupola Practice," by R. H. Palmer, Salem, Ohio.
"The Foundry Foremen's Educational Movement," by D. O. Wilson, Newark, N. J.
"The Briquetting of Metal Borings and Turnings," by Dr. R. Moldenke, Watchung, N. J.
Presentation of data on the molding sand tests of the A. F. A.
Memorandum on the standard test bar for cast iron.

Other papers have been promised, but titles are not yet available. Details of the programme, both as to entertainment and sessions for the reading of papers, will be furnished later.

The Triple Supply Convention

The closing sessions of the triple convention of the American Supply and Manufacturers' Association, the National Supply and Machinery Dealers' Association and the Southern Supply and Machinery Dealers' Association, at Louisville, Ky.,* on Wednesday, April 5, brought out some interesting opinions on the subject of resale prices. The general sentiment expressed was to the effect that manufacturers should set a minimum price with a clear margin of profit at which their goods should be sold.

The three associations held separate meetings on Wednesday morning and elected their officers.

The manufacturers at their morning meeting discussed apprenticeship systems. In that connection Willard Parker, Pennsylvania Shafting Company, Spring City, Pa., declared that the increased cost of living is creating a scarcity of apprentices. He pointed out that the best interests of boys who would ordinarily become apprentices are sacrificed for the benefit of the family, as they are put at work which is more remunerative because the money is needed at home.

R. K. Hodgkins, Yale & Towne Mfg. Company, New York, described the industrial school maintained by his company, but he added that very often missionary work is necessary to get the boys to enlist in the school.

Another speaker stated that under modern methods the apprentice will soon be a thing of the past. He declared that the developments of the college trained men along mechanical lines is doing away with the need for mechanics. "The knowledge in mechanical lines to-day," said he "is in the drawing room, where the designing is done and not in the shop. Where we need our apprentices more than anywhere else is in the toolroom. The tendency is to educate operators instead of general mechanics. It seems to me that the development of specialists is more important than the development of all-round mechanics."

Edward C. Henman, American Steam Pump Company, Battle Creek, Mich., spoke along the same lines. He said that the machinist trade is not taught in these days, adding: "We can buy the best machinery designed by clever people, and all we need to do is to make machine hands. Even the makers of the most intricate machinery are training operators whose knowledge is confined to the work done by one particular machine. In many lines of manufacture the day of the apprenticeship system is over."

The Manufacturers' New Officers

The manufacturers made short work of electing their officers, as the report of the Nominating Committee that had been appointed was accepted and passed unanimously. The following officers were elected:

President, Willard Parker, Pennsylvania Shafting Company, Spring City, Pa.; first vice-president, N. A. Gladding, E. C. Atkins & Co., Inc., Indianapolis, Ind.; second vice-president, D. K. Swartwout, Ohio Blower Company, Cleveland, Ohio; third vice-president, C. H. Jenkins, Moran Flexible Steam Joint Company, Louisville, Ky. Executive Committee: W. H. Fisher, T. B. Wood's Sons Company, Chambersburg, Pa.; E. A. Ludden, Detroit Oak Belting Company, Detroit, Mich.; J. E. Osgood, J. M. Carpenter Trap & Die Company, Pawtucket, R. I.; R. H. Hodgkins, Yale & Towne Mfg. Company, New York; J. W. Malcomb, New York Belting & Packing Company, New York. F. D. Mitchell was re-elected secretary-treasurer.

The National Dealers' Officers

The National Supply and Machinery Dealers' Association, at its morning meeting, devoted a great deal of time to discussing resale prices, after which the following officers were elected:

President, W. L. Rodgers, Pittsburgh Gage & Supply Company, Pittsburgh, Pa.; first vice-president, Henry Prentiss, Prentiss Tool & Supply Company, New York; second vice-president, J. O. Harron, Rickard & McCone Company, San Francisco, Cal.; advisory secretary-treasurer, T. James Fernley, Philadelphia, Pa.; secretary-treasurer, Thomas A. Fernley, Philadelphia, Pa. Advisory Board: Edgar E. Strong, Strong, Carlisle & Hammond Company, Cleveland, Ohio; George Puchta, Queen City Supply Company, Cincinnati, Ohio, and Wallace Pattison, W. M. Pattison Supply Company, Cleveland, Ohio. Executive Committee: W. T. Todd, Somers, Fitler & Todd Company, Pittsburgh, Pa.; M. B. Barkley, Cameron & Barkley Company, Charleston, S. C.; Charles Farquhar, Chanler & Farquhar Company, Boston, Mass.; George Vonnegut, Vonnegut Hardware Company, Indianapolis, Ind.

The Southern Dealers' Officers

The Southern Supply and Machinery Dealers' Association elected the following officers:

President, W. P. Simpson, C. F. Patterson Company, Ltd., New Orleans, La.; first vice-president, S. M. Price, S. M. Price Machinery Company, Norfolk, Va.; second vice-president, I. F. Young, Young & Vann Supply Company, Birmingham, Ala.; secretary-treasurer, Alvin M. Smith, Smith-Courtney Company, Richmond, Va.; chairman Executive Committee, H. C. Clark, Charlotte Supply Company, Charlotte, N. C.; chairman Manufacturers' and Conference committees, W. H. Banks, Banks Supply Company, Huntington, W. Va.; chairman Textile Committee, D. G. Morton, Carolina Supply Company, Greenville, S. C.; chairman Membership Committee, George P. Dougherty, Fox-Harris Machinery & Supply Company, Pine Bluff, Ark.

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The three separate conventions were adjourned and a joint meeting of the associations was held at noon. President Parker of the Manufacturers' Association presided, and addresses were made by Mr. Simpson, the new president of the Southern Dealers' Association, and Wallace M. Pattison, who spoke in the place of Mr. Rodgers, president of the National Dealers' Association, who was detained at home by illness.

Speaking of the place for the next convention, President Parker said that the manufacturers would be willing to join the dealers at any place of meeting they might elect, and he suggested that before adjourning the very important matter of resale prices be discussed. Mr. Hodgkins, Yale & Towne Mfg. Company, said that he thought that it would be wise to let the manufacturers manufacture and let the machinery and supply dealers distribute. He said that his firm endeavored to maintain resale prices, and they found that each year more and more of the supply men were supporting them. Another manufacturer said that he made no attempt to distribute his products except through the local agents, and he always protected them in resale prices. A representative of the Detroit Lubricating Company declared that his company made a practice of establishing a minimum rather than a maximum price, but there was nothing on its goods indicating the price they were to be sold at. A Texas dealer called attention to the fact that under the stringent laws of that State the distributer there cannot enter into any price agreement, and so it was found hard to get to an understanding. He said that the dealers there are perfectly willing to accept manufacturers' resale prices, but would have to insist on a fair margin of profit. Another dealer argued that it would not be policy to establish a resale price on all goods, and said that the dealers only want resale prices on material where the margin of profit is too small.

This last remark brought out the interesting fact that at one of the dealers' sessions a ballot was taken as to the cost of doing business, and it developed that 16.15 per cent. must be added to the price paid for goods; in other

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The entertainment features of the convention reflected credit on the committee in charge. A reception to the officers, followed by dancing and cards, took place on Monday, and on Tuesday night there was a supper, followed by a vaudeville performance. The majority of the members attended an excursion to the Mammoth Cave on Thursday. A special programme of outings, including an automobile ride and river excursions, was arranged for the entertainment of the ladies attending the meetings.

Modern Business Methods*

BY WALLACE M. PATTISON.†

Early history treats of those great leaders who lived in an age of conquest, whose reputations were made on the field of battle, such as Alexander the Great, Hannibal and Julius Caesar. Later we pass into that age where science and the arts first made their influence felt. This was followed by the age of discovery which opened up this continent to civilization. This is the age of business, the greatest business age in the history of the world. And especially is this true of America. Never were there greater business opportunities or greater facilities for building up business than exist in our age and this country. And it is the man who has grasped the opportunities that these greater facilities open up to us who is the greatest business genius of his time.

Organization the Greatest Factor in Building a Business

Without doubt the greatest factor in building a large business is organization. Organization is defined as the process of disposing or arranging constituent and interdependent parts into an organic whole. That definition may be a little complicated, but we can say, in a broad way, that organizing is systematizing. The object of organization is to bring men together for work and action, and in order that the work may be efficiently and well done and the action strong and forcible, the organization must move forward as one united whole.

And herein lies the genius of the organizer. It is easier to talk about than it is to carry out. When a man's business, or his work for that matter, becomes larger than he can take care of himself, he seeks for assistance, and from that moment he becomes an organizer, and his success as an organizer will depend upon his ability to select his assistants and transfer his own work to them and to inspire those assistants with his own ideas, his own energy and his own ability. Emerson says: "Every great business is but the lengthened shadow of one man," and I think he is about right. It is organization that helps us to lengthen our shadows. There is but little than any of us can do individually. There are only 24 hours in a day, and all we can hope to do is to give a third of that time continuously; but if we have this ability of organization and for executive work, we can go on multiplying ourselves by thousands and hundreds of thousands, and it is this that makes business to the ambitious man so attractive. No concern has yet reached the limitations of organization, not even the great and powerful Standard Oil Company or the great United States Steel Corporation. There are still limitations for the ambitious man who is willing to work and reach for them.

The first factor in organization that I would refer to is co-operation. That great steel master and successful business man, Andrew Carnegie, in giving a business address some years ago, which I read, likened business to a three-legged stool, and he called the three legs, capital, labor and management. But I have often thought that a three-legged stool is not the securest kind of a seat, and if I might be so presumptuous as to make a suggestion to that distinguished man, I would say add another leg to your stool. And I would call that fourth co-operation. Capital, labor, management, and the co-operation of these three are what tend to the greatest success in modern business.

And now a word in regard to system. I said organizing was systematizing. But my experience has been this, that the man who employs system must be sure to be the master of system and not the slave of system. I have seen many businesses choked and bound and tied with the red tape system. I think there is more danger of system being overworked than underworked. I wouldn't have you believe that I am not a believer in system, because no man can accomplish much without system.

A Business Man Must Be a Manager of Men

I have said that the greatest factor in building a large business is organization. I would like to say now that the greatest factor in organization, in my estimation, is the human factor. It is not things that make life, it is people. It is not things that makes business, it is people—people with red blood in their veins—men and women with hearts and feelings and aims and wishes, men and women susceptible to encouragement and sympathy and training and discipline. This is the great and important raw material that any modern business man aiming to do a large business must deal with.

Too many of us are paying too much attention to the things of business and too little to the people who make and handle the things. To the modern business man it makes very little difference what kind of business he is in, it makes very little difference whether he is handling hardware or groceries or dry goods, or running a bank or a railroad or a school. These are but the things of business, the medium in which he exercises his business ability. I venture to say that our great and distinguished fellow citizen, Mr. Rockefeller, would have made as great a success out of the steel business as he has made out of the oil business, and that Mr. Carnegie would have made just as big a success of the paint business as he did of the steel business. And think of the tremendous success that the mighty Roosevelt would have made out of the advertising business.

But what I want to make clear is that the modern business man is a manager of men and not a manager of things. This human factor that I have referred to touches our business on all sides. First, it touches us on the side of the people who make our products; and next on the side of the consumer who uses our products. The staff must be made efficient, loyal and enthusiastic. We must have their whole-hearted co-operation and good-will; and the consumer must be satisfied.

In dealing with the staff it has been my experience that the problem of handling the staff is how to get the best out of them, not how to get the most out of them. The standard of the staff makes the standard of the house, and the standard of the house makes the standard of the service. If we have got the right kind of staff, well trained, well handled, all the rest will be easy.

Organizing an Efficient Staff

How are we going to organize, train and develop an efficient staff? First in importance I would say is the selection. It is astonishing how careful we are when we come to buy some new equipment or to put up a new building—the care that we take to investigate all sides of that proposition; but when it comes to the living machinery, we wait until we need an extra hand and then we take the first one that comes along. You will never secure an efficient staff in that way. Every organization should have some systematic method of securing applicants, looking into their history, making sure that they are in every way suitable for the work, and beginning with the office boy, right through, too much care cannot be taken in making your selections.

And next I would say, in building up a strong organ-

* Paper presented before the National Supply and Machinery Dealers' Association at Louisville, Ky., April 14.
† The W. M. Pattison Supply Company, Cleveland, Ohio.

The Triple Supply Convention

The closing sessions of the triple convention of the American Supply and Manufacturers' Association, the National Supply and Machinery Dealers' Association and the Southern Supply and Machinery Dealers' Association, at Louisville, Ky.,* on Wednesday, April 5, brought out some interesting opinions on the subject of resale prices. The general sentiment expressed was to the effect that manufacturers should set a minimum price with a clear margin of profit at which their goods should be sold.

The three associations held separate meetings on Wednesday morning and elected their officers.

The manufacturers at their morning meeting discussed apprenticeship systems. In that connection Willard Parker, Pennsylvania Shafting Company, Spring City, Pa., declared that the increased cost of living is creating a scarcity of apprentices. He pointed out that the best interests of boys who would ordinarily become apprentices are sacrificed for the benefit of the family, as they are put at work which is more remunerative because the money is needed at home.

R. K. Hodgkins, Yale & Towne Mfg. Company, New York, described the industrial school maintained by his company, but he added that very often missionary work is necessary to get the boys to enlist in the school.

Another speaker stated that under modern methods the apprentice will soon be a thing of the past. He declared that the developments of the college trained men along mechanical lines is doing away with the need for mechanics. "The knowledge in mechanical lines to-day," said he "is in the drawing room, where the designing is done and not in the shop. Where we need our apprentices more than anywhere else is in the toolroom. The tendency is to educate operators instead of general mechanics. It seems to me that the development of specialists is more important than the development of all-round mechanics."

Edward C. Henman, American Steam Pump Company, Battle Creek, Mich., spoke along the same lines. He said that the machinist trade is not taught in these days, adding: "We can buy the best machinery designed by clever people, and all we need to do is to make machine hands. Even the makers of the most intricate machinery are training operators whose knowledge is confined to the work done by one particular machine. In many lines of manufacture the day of the apprenticeship system is over."

The Manufacturers' New Officers

The manufacturers made short work of electing their officers, as the report of the Nominating Committee that had been appointed was accepted and passed unanimously. The following officers were elected:

President, Willard Parker, Pennsylvania Shafting Company, Spring City, Pa.; first vice-president, N. A. Gladding, E. C. Atkins & Co., Inc., Indianapolis, Ind.; second vice-president, D. K. Swartwout, Ohio Blower Company, Cleveland, Ohio; third vice-president, C. H. Jenkins, Moran Flexible Steam Joint Company, Louisville, Ky. Executive Committee: W. H. Fisher, T. B. Wood's Sons Company, Chambersburg, Pa.; E. A. Ludden, Detroit Oak Belting Company, Detroit, Mich.; J. E. Osgood, J. M. Carpenter Trap & Die Company, Pawtucket, R. I.; R. H. Hodgkins, Yale & Towne Mfg. Company, New York; J. W. Malcomb, New York Belting & Packing Company, New York. F. D. Mitchell was re-elected secretary-treasurer.

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In dealing with the staff it has been my experience that the problem of handling the staff is how to get the best out of them, not how to get the most out of them. The standard of the staff makes the standard of the house, and the standard of the house makes the standard of the service. If we have got the right kind of staff, well trained, well handled, all the rest will be easy.

Organizing an Efficient Staff

How are we going to organize, train and develop an efficient staff? First in importance I would say is the selection. It is astonishing how careful we are when we come to buy some new equipment or to put up a new building—the care that we take to investigate all sides of that proposition; but when it comes to the living machinery, we wait until we need an extra hand and then we take the first one that comes along. You will never secure an efficient staff in that way. Every organization should have some systematic method of securing applicants, looking into their history, making sure that they are in every way suitable for the work, and beginning with the office boy, right through, too much care cannot be taken in making your selections.

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ization, is the necessity for providing a good place for the staff to work in. The modern business building to-day provides—ought to in all cases—good light and heat and ventilation, good washrooms and lockers, and a clubroom and a reading room and luncheon rooms. These are things that make your store a good place to work in, and they are not rare in business to-day. These things that are provided should always be provided in the spirit that the staff are entitled to them, and not in the spirit of charity, but in the spirit that it is a good thing for the concern as well as a good thing for the staff. In any other kind of spirit the results will be not what we expect.

And third in importance, in building up an efficient staff, I would put training. How many concerns have a systematic method of training the people of their organization? And yet it is of the very highest importance, if we are to develop the right kind of staff. We send our boys and girls to school and they are thoroughly grounded in the different grades, with great patience and care. But when they have finished school we send them into business and they usually have to make their way with no systematic training. So that every modern business house ought to have some systematic method of training its staff.

I might state that the employees of my company have an organization known as the Pattison Progress Club. Practically every employee that has to do with the selling end is a member. They formulate their own rules and regulations and take entire charge of their meetings, which are held monthly. They are addressed by representatives of the manufacturers whose lines we handle, or at times they assign to some employee a topic on which he lectures, followed by a general discussion. Question boxes are provided, and the answers to these questions are fruitful in good results. At other times they are asked to criticise whatever may be objectionable to them in the general management of our business, and I beg to assure you that some of the suggestions offered are quickly adopted, owing to their merit. We are glad to encourage these meetings, and furnish them a suitable clubroom where they can meet. We find these meetings most beneficial in developing a higher standard of efficiency and a spirit of co-operation far-reaching in its effects.

The Spirit of the Employees Builds a Business

Building a business has always appealed to me as very much the same thing as building a nation. What is it that makes a nation great? It is the spirit of the people, is it not? And what is it that creates that spirit? It seems to me it is the constitution under which they live; it is the institutions under which they are governed; it is the customs and habits and the achievements of the people. These are the things that create national spirit in a people. Now, if we can get that same thing into our business, we will get the same kind of a result—whole-hearted, loyal, enthusiastic service.

It is, therefore, of the highest importance that every man that comes into your business should know what the principles and policies of the concern are. He should be told that you expect to win on merit; that you are broad and liberal as well as aggressive in your policy and methods; that he should be loyal to your house and to all the employees, and that he should strive constantly for the improvement and advancement of the business and himself. He should be polite, courteous and truthful in all his dealings within and without the house. The keynote of these principles is efficiency. They should make the most of the business by making the most of themselves.

If you but encourage the young men starting with you to strive to make the most of themselves, and give them the opportunity to make the most of themselves, I have but little doubt that your business will grow and develop to meet your fondest expectations. Set your standard high. Impress upon your men that it is quite as much to their interest as your own that this goal should be reached. The reason we sometimes do not accomplish more is because we do not attempt more. The successful man to-day has something of daring in his make-up, and must be willing to back his judgment, and take some chances.

And in closing I would just like to say this, that the man who is in business merely for the dollars and cents that are in it, who sees nothing more than the profits, will never make, in my estimation, a high success of his business. Unless he sees the opportunity for a useful career not only for himself but for others, he cannot reach the highest success.

Unfilled Orders of the Steel Corporation

The statement of the United States Steel Corporation published April 10 shows that unfilled orders on the books of subsidiary companies increased 46,758 tons in March, the total on March 31 being 3,447,301 tons, against 3,400,543 tons on February 28. A comparison is made below of the figures for March 31 with those issued monthly beginning with July 31, 1910, and with the quarterly statements beginning with December 31, 1908.

March 31, 1911.....3,447,301	July 31, 1910.....3,970,931
February 28, 1911...3,400,543	June 30, 1910.....4,257,794
January 31, 1911...3,110,919	March 31, 1910.....5,402,514
December 31, 1910..2,674,757	December 31, 1909..5,927,031
November 30, 1910..2,760,413	September 30, 1909..4,796,833
October 31, 1910....2,871,949	June 30, 1909.....4,057,939
September 30, 1910..3,158,106	March 31, 1909.....3,542,595
August 31, 1910....3,537,128	December 31, 1908..3,603,527

The unfilled orders at the close of the years preceding 1908 were as follows: 1907, 4,624,552 tons; 1906, 8,489,718 tons; 1905, 7,605,086 tons; 1904, 4,696,203 tons; 1903, 3,215,123 tons; 1902, 5,347,523 tons.

It is understood that new orders entered in March were upward of 950,000 tons, or somewhat more than 35,000 tons a day for 27 business days, while shipments were above 900,000 tons, or at a rate considerably in excess of those for February.

The Hart-Parr Company's New Foundry.—The Hart-Parr Company, Charles City, Iowa, manufacturer of oil cooled gas tractors, has under construction a new gray iron foundry, 248 x 270 ft. The main bay of the building is 50 ft. wide, and is to have two electric traveling cranes to handle the large flask work. There are bays on each side of the 50-ft. bay 33 ft. wide, and on the south side of the building are three sections of saw tooth construction, each 30 ft. wide, running the entire length of the building. These sections are to be divided off into offices, and locker, pattern storage, pattern repair, casting and cleaning rooms, making the entire foundry work under one roof. The equipment from the old foundry will be utilized as far as possible, and as soon as it is installed in the new foundry the old building will be used for a forge shop. Nearly all the new equipment for the new building has been contracted for. This includes a No. 9 Whiting cupola, two 10-ton Shepard electric cranes, one extra heavy large molding machine built by the Taber Mfg. Company, and other smaller equipment. The company will have about 7½ acres of floor space under cover upon completion of the new building.

Lake Superior Iron Ore Analyses.—The Lake Superior Iron Ore Association, Rockefeller Building, Cleveland, has published its pamphlet for 1911, giving the analyses of Lake ores, as shown by complete cargo averages for the season of 1910. The list is fuller than that of any previous booklet, the distribution of the ores of which analyses are given being as follows: Gogebic range, 49; Marquette range, 66; Mayville range, 2 (Iron Ridge and Mayville); Menominee range, 54; Mesaba range, 101; Vermilion range, 7; Michipicoten district, 3; Sudbury district, 1 (Moose Mountain). In the cases of new ores the expected analyses for 1911 are given.

Contracts for installing a heating and ventilating system in the new New York City post-office were let April 6 to Baker, Smith & Co., New York, at their bid of $165,000. The Otis Elevator Company got the contract for installing electric elevators at a bid of $139,000.

The Pittsburgh-Westmoreland Coal Company

Developments in the New Washington County Field

The old Connellsville coal basin, extending from Latrobe to Fairchance, Pa., has only from 30,000 to 35,000 acres of unmined coal. Owing to the very heavy consumption of coke the average exhaustion of this basin is now at the rate of 2400 to 2600 acres per year. As a definite limit thus appears to be established for the supply of coke from that region, it is fortunate that good coking coal with low sulphur, the equal of that from the old Connellsville basin, was discovered a few years ago lying in Washington County, southwest of Monongahela City. The Jones & Laughlin Steel Company and the Lackawanna Steel Company secure their coke from this field. The land not owned by the steel companies is owned by the Pittsburgh-Westmoreland Coal Company and the Pittsburgh-Buffalo Company, the Pittsburgh-Westmoreland Coal Company owning about 17,000 acres, or an acreage equal to about one-half the unmined coal in the old Connellsville basin to-day. The land values in this particular coal field have risen remarkably the past six or seven years. Land that could have been purchased in 1904 for $500 to $600 per acre could not be purchased now for $1200 to $1500 per acre.

Extent of the Company's Operations

In 1907 the Pittsburgh-Westmoreland Coal Company, whose general offices are in the Fulton Building, Pittsburgh, Pa., with branch offices in Cleveland, Detroit and Buffalo, started to develop new mines and coke ovens, the mines to have a capacity of 15,000 tons a day with a plant of 2000 mechanical coke ovens, which would produce 6000 tons of coke a day. During the panic this work was suspended, but last year a large mine was opened near Bentleyville, Pa., and there were erected and completed 300 of the new ovens. These ovens have a total capacity of 1000 tons a day, and the operation of the plant is wholly mechanical. In the next year and a half the company will complete three new coal mining plants and 1500 new ovens, increasing its coal production to 6,000,000 tons a year, and as a third of it will be manufactured into coke its coke production will be 1,500,000 tons per year.

The coal is uniformly under 1 per cent. in sulphur, and runs only 4½ to 5 per cent. in ash, while it is almost free from phosphorus. On account of the low sulphur and low ash, it is possible to take the slack and manufacture it into coke, shipping the lump coal to market for gas making, malleable iron purposes and steel melting. The coal of this particular field is claimed to be the only coal known in the country where the slack is low in sulphur and can be turned into coke; other plants, even in the Connellsville district, using run of mine coal where coke is made.

Everything Done Mechanically

The plant of the Pittsburgh-Westmoreland Coal Company is unique in the fact that everything is done mechanically. The coal is dumped on a tipple, the lump coal going into railroad cars, and thence to market, and the slack coal running by gravity on a belt, which takes it to a large concrete bin, holding 2500 tons. From this bin it runs by gravity into six jigs, where the small particles of slate and dirt are removed from the slack coal, which is then again elevated to a large bin. From the bin the slack coal drops into a larry by gravity and is hauled to the different ovens and dropped in. When run of mine coal is used, no slate is removed, this coal being sent directly to the ovens as it comes from the mine. A mechanical leveler, which operates on a track on one side of the ovens, quickly levels the coal, the doors are closed, and the coking process is completed without further labor. At the end of 48 hours, when the coke is fully burned, the doors are opened, and a pusher, which runs on the same track as the leveler, pushes the coke on a conveyor which carries it into a coke car in large lumps and screens the coke during the conveying process.

On account of having the ovens operated by doors, the ovens are not open more than 20 or 30 minutes and the high heat is maintained in these ovens at all times, making the coke very hard, with good cell structure and the highest burden bearing qualities.

The team work noticed at this plant among the machines and the men who operate them is very interesting. The doors of the ovens are opened ahead of the pusher and conveyor and five or six ovens are kept watered ahead of the machinery. The conveyor is a large and very heavy machine with a cab on it at a hight greater than the ovens. It not only conveys the coke and screens it but it also shifts the railroad cars. The hight of the cab on the conveyor enables the operator to look across over the ovens and signal to the man who operates the pusher machinery, so that there is perfect team work in the removal of the coke from the ovens. The larryman then immediately fills the oven full of raw coal. The man who operates the leveling machine is waiting for the larryman to drop the coal into the oven, and levels the coal within two minutes after the coal is dropped into them. The doors are then closed, and this finishes the entire labor in the manufacture and removal of the coke into railroad cars.

Through the almost automatic operation the cost of the manufacture of coke at this plant has been reduced to approximately 15 cents a ton, which is to be compared with 35 to 40 cents in the ordinary bee-hive ovens in the Connellsville field.

This new field of coking coal promises in a few years to be the center of the coke making industry of western Pennsylvania. The discovery of this field and its successful development will add great wealth to the Pittsburgh district. The best coke in the world has for many years been that made in the old Connellsville basin, but it has been proved that this field of coal makes coke of equally high quality and thus prolongs the period in which such coke will be available in western Pennsylvania.

The Proposed Southern Merger

At the request of various classes of security holders of the Southern Iron & Steel Company and of the Alabama Consolidated Coal & Iron Company, Cecil A. Grenfell, of London; Alexander J. Hemphill, president of the Guaranty Trust Company; Charles Hayden, of Hayden, Stone & Co.; Benjamin Strong, Jr., of the Bankers' Trust Company, and Henry H. Melville, of Montreal, have consented to act as a committee to carry out a plan for the merger of the two companies. A plan and deposit agreement embodying the basis of the proposed merger and reorganization will be filed with the Bankers' Trust Company of New York as depositary, under which security holders will be invited to deposit their securities. Holders of the Southern Iron & Steel Company first and refunding mortgage 20-year gold bonds, 6 per cent. gold debentures, 1-year, 6 per cent. gold notes, preferred stock and common stock are notified that default having been made in the payment of interest on the bonds and debentures, Edwin G. Merrill, John W. Platten and Harry Bronner have consented to act as a committee for the protection of their interests. Holders of securities are requested to deposit them with the Union Trust Company of New York.

The New York and New Jersey Branch Metal Trades Election.—The New York and New Jersey Branch of the National Metal Trades' Association held its annual meeting April 10, and after a luncheon at the Machinery Club of New York elected the following officers: President, Michael Fogarty, New York; vice-president, M. K. Bowman, Bowman-Edson Company, New York; treasurer, L. A. Bevin, Rider-Ericsson Engine Company, New York. Executive Committee: A. B. See, A. B. See Electric Elevator Company, New York, and Peter Weber, Edison Phonograph Works, West Orange, N. J.

& SONS.
Mechanical and Civil Engineers,
PITTSBURGH, PA.

MUTUALITY*

The Betterment of Industrial Conditions Good Business Policy

BY W. A. GRIEVES, COLUMBUS, OHIO.†

Co-operation has become the dominant consideration in present day business. Its power is being emphasized in every movement toward social and industrial progress. Manufacturers realize that only through this medium can their mutual interests as manufacturers be best conserved. As successful business men you know the necessity of co-operation, one with the other, in obtaining the results for which you are striving. You are here to-day with this one dominating thought: "What can we do that will bring greater harmony and consequently larger gains to our business?"

Now, it has always seemed to me that in this effort toward co-operation we have been working from effect to cause when we should have been working in the reverse order—from cause to effect. We have been directing our efforts in combating undesirable influences and conditions, for the making of which we have been at least to some degree responsible. But we are learning and there are encouraging signs for the future, as I notice, in glancing over the report of the last annual meeting of your association, a statement in the report of your commissioner, which reads:

> The past year has been rather uneventful in labor incidents, your officers having devoted more of their time to preventing rather than combating labor difficulties.

That sounds good. It is getting at the nerve of the whole matter. It is fast becoming the spirit of the hour. We are beginning to see that the differences between employer and employee are not, after all, so much of a problem. We are thinking of them in terms of a condition, and the efforts of your officers to improve that condition point to a new era of more amicable relationship.

A New Idea Among Employers

To the thoughtful employer and business man has come a new idea. He is beginning to regard any movement for the betterment of industrial conditions as not only humanitarian but as good business policy.

Frequently we hear it said that any effort toward labor efficiency betterment has its origin, not in the desire for public good, but in selfishness, and some employers are inclined to regard it with a degree of suspicion. They have seen some failures, some evidence of ingratitude on the part of employees, and because of this have said there is nothing in it. But with this view we have very little sympathy. Our years of experience in associating and working with men compel us to regard any such conception as wrong. And this is the line along which progressive and farsighted employers are thinking and working; and judging from your commissioner's report of last year, it has been effective.

To my way of thinking there is no other solution, and the fact that your association has honored me by inviting a discussion of the subject of labor efficiency betterment among employees is evidence that the desire is strong on your part to improve the condition.

Labor efficiency betterment, as generally conceived, is not a new factor in industrial life. For years many attempts have been made along this line with varying degrees of success. Like every other phase of industrial progress, experiments had to be made, and in doing so many mistakes have resulted. But these are to be expected in every line of activity having as its aim the improvement of the condition.

The honest and aggressive employer is asking the question: "What elements can I bring into my business that will increase the output, reduce the cost of production, and at the same time raise the wages and earning capacity of my employees?"

Workmen Must Have Inviting Environment

In the consideration of these questions many employers have not observed the fundamental element essential in obtaining the results he is seeking. If the output of his business is to be increased, he must employ the best workmen, for the burden or overhead is no greater for a good man than a poor one; and if his shop is run on modern plans, he can reduce the cost of production, at the same time raise the wages and earning efficiency of his men, as well as greatly increase production.

But the problem does not end here. If the employer is to have the most competent and intelligent men in his service he must provide the most inviting environment, for intelligent and thrifty men seek the most intelligent and wholesome places to work. Now, the difficulty in the way of greater progress in the field of industrial betterment seems to lie in the fact of the employer not knowing just how far he can go and at the same time avoid the criticism that he is paternalistic. To strike the middle ground between these extremes is the question. To do so, the employer must know his men; and if his business is such that a personal contact with his employees is impossible, he should secure the services of some one qualified by training or natural ability to do it for him.

The Social Engineer

This condition has led to the creating of a new field in present day industry—namely, that of the social engineer. I don't know that the title is a good one, but it seems to be the best to designate the calling that has yet been found.

Mutuality, or labor efficiency betterment, if it is to mean anything, must not be hurried. All permanent things are of slow growth, and this feature of modern industry cannot be made an exception. As in many other lines of moral and physical uplift, the progress of labor efficiency betterment has been greatly retarded because of the mistakes of those who, eager in their desire for personal gain, have made it a matter for commercial exploitation.

The average workman is at once suspicious of anything suddenly thrust upon him, even though it may be for his wellbeing. To be successful, therefore, any attempt at industrial betterment must be approached from the standpoint of a thorough understanding on the part of the employer and employee that it is to be for their mutual interests.

I recall very distinctly an incident in my early experience in this work of an ill fated attempt to hurry a project that was designed to help promote mutuality, but which was turned down by the employees for no other reason than that they did not understand it. The lesson was somewhat dearly learned, but it was far-reaching. It taught me that if the work in which I was engaged was to succeed it must be brought about slowly, step by step, here a little and there a little, until the entire confidence of the men has been secured.

To obtain this some person must have the work constantly in mind, and while it is necessary that the start should come from the employer himself or some one delegated by him, the greatest results will not be found until the employees themselves have been enthused to the degree that they will make suggestions direct. Get an employee to feel that the responsibility for carrying into effect his own suggestion devolves upon him, and in

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* Address before the National Metal Trades Association, New York, April 12.

† Employment superintendent, Jeffrey Mfg. Company.

nine cases out of ten he will work hard to see that it is done.

How to Win the Support of Workmen

Allow me to illustrate this point by a specific incident which occurred in our own plant about two years ago. We had a mutual aid association that had been in existence for about 18 years. It had been through all the vicissitudes and trials incident to associations organized along similar lines. It had done much good, but had not elicited the support of the employees to the degree that was possible under different organization.

It fell to the lot of the writer to attempt a reorganization. A plan was submitted which, if carried out, we believed would increase the membership at least 200 per cent., this conclusion being reached after a careful study of the situation. The evening upon which the vote was to take place arrived, but it was discovered that two or three men who had not been consulted about the plan, and who consequently misunderstood it, were doing all in their power to defeat it. These men were influential among their fellows to the degree that defeat of the plan was inevitable. Seeing the situation was hopeless, I moved that a committee composed of these men and myself be appointed to reconsider the plan, claiming that nothing could be lost by the delay. After much argument the motion was carried.

The committee met and, instead of taking the initiative in the discussion, I asked for a suggestion as to how the plan might be improved. The member who had been the principal cause of opposition made a suggestion of change, the adoption of which did not in reality affect the original plan, but the insertion of which seemed to win him wholly for it. He was made chairman of the committee and made the report to the association at its next meeting. The plan was unanimously carried and inside of one year the membership had increased nearly 300 per cent.

I cite this merely to show that if results are to be obtained the interest of the men must be secured. They must be educated to realize that everything that helps to make more desirable the working conditions is an advance toward the goal of harmonious relationship and better understanding.

When the Jeffrey Company Began Systematic Industrial Betterment

While the company which I represent has always been interested in seeing that good physical conditions existed about the plant, it was only about two years ago that steps were taken for a definite policy of industrial betterment. And in this connection let me say that the work was not conceived through any spirit of sentiment, but rather as a business proposition. Our company has always acted upon the belief that that which is good for the employee must be good for the employer, and this idea has constantly been emphasized to the employee as each phase of our labor efficiency betterment has been developed. That this plan has worked satisfactorily and produced results is not due, we believe, so much to anything we ourselves have done as it is to the fact that it is right and human. We believe that there is no danger in sympathetic co-operative fellowship of employer with employee, a fellowship of purpose and interest, established not upon the plane of paternalism, but upon the plane of justice to both. The greatest strength and largest hope for the great industrial forms, which all fair-minded men are seeking, depend upon our finding this meeting ground of common interest and purpose.

Partnership with our workmen and the desire to realize it with all its benefits is fast becoming the dominant consideration. Gradually we have reached this point and are finding the call of duty, with regard to the question of protection of health and limb of our workmen and many kindred questions, lengthening out straight and clear before us, and have found opportunity for accomplishing the needful things waiting at our doors. This is not said from the standpoint of those who have attained, but rather from that of those just beginning to do and who are finding a sense of satisfaction in working out these problems which have as their supreme aim the workman's right to all that is due him.

Some Details of the Jeffrey Company's Methods

Now, as this discussion was to contain practical suggestions, I shall briefly enumerate some of the phases of industrial betterment being successfully carried on by our company. After the reorganization of our Mutual Aid Association two years ago, we adopted the plan of strongly requesting each new employee upon entering the employ of the company to take membership in the association. This method of securing members, of course, has proved tremendously prolific. While membership is not compulsory, the benefits are so attractive that more than 93 per cent. of all employees who did not already have all the protection they could afford to carry have been secured for membership. This has been an excellent protection for our men, as an employee can secure for the small sum of $1 per month as high as $200 in benefits in one year.

Before making self-protection a part of the employee's obligation upon entering our employ, the Mutual Aid Association was continually calling upon the members for special assessments, and frequently appealing to the company for contributions. Under the new plan we have had each year, after paying all claims, $2000 in the treasury, all at a cost of one-third to two-thirds less than under the old plan.

Our experience shows that as a rule the average employee will not protect himself unless urged to do so; and while some employers contribute as much as 50 per cent. of the premium to these associations, it does not act as an inducement for the men to join. Given the proper organization, together with due emphasis upon a man's duty to protect himself, and the responsibility of the success of the organization placed entirely upon the men, you can count upon a reasonably prosperous association. Men appreciate most that which costs something, whether it be in money or effort in social service.

Plan of Caring for Injured Men

Next in importance to our system of accident prevention by the constant installation of the latest safety devices is our plan for caring for our injured men. About three years ago we made a careful study of the number of men who were off work owing to slight injuries, which in themselves were not serious, but through the lack of proper antiseptic treatment had become infected. Our records showed that on an average as high as a half dozen men were away from work daily for this reason. As it had always been our policy to pay wages for a portion of the time lost by our employees through injuries, this investigation revealed a condition that represented a twofold loss. We reasoned that under proper antiseptic treatment these infections could be reduced to a minimum, and not only would we save the amount of the employee's wages, but also the greater loss occasioned by a decreased production.

It was not unusual to find some of our most skilled and highest paid mechanics off work for several days because of infection caused by a slight cut or bruise, and when you count what that may mean in decreased production, not only of the injured man himself, but also the possible holdup of an order all along the line, it is not easy to determine the loss.

From the standpoint of cold business this condition demanded a remedy. We at once set to work and thoroughly equipped an emergency hospital, and placed a regularly graduated physician and trained nurse in charge. The doctor's entire time is given to the hospital work, and he is assisted in the mornings with the redressings by the nurse. The nurse's time in the afternoon is given up entirely to visiting sick or injured employees or their families. Out of some 4000 cuts, bruises, sprains, &c., together with redressings to the number of over 4000 last year in our plant, the infections resulting did not average more than four per month.

At the close of this report will be found a summary of the surgical and medical cases taken care of in our hospital for the year ending October 31, 1910.

These figures might suggest to you that there was an abnormal number of accidents in our shops. Such is not the case, however, as we have been told by inspectors that our plant is among the best in the use of safety devices and ways of accident prevention. We believe there are no more accidents in our shops than may be found in any modern and well equipped factory employing the same number of men.

You may ask of what direct benefit to us is it to have the doctor treat such ailments as colds, indigestion, headache, cramps, sore throat, boils, and all the other ailments noted in the list. We answer for the very same reason that it pays us to prevent infection resulting from injury; for the reason that if a man is valuable to have in our employ, he is more valuable if he is in a good physical condition. If an employee has a headache or cramps, it is more profitable to have him treated at our own plant, relieved of his suffering, and sent back to work within an hour, than it is to have him lose a whole day. Then, too, the work our doctor does in the way of preventing illness among our employees, by prescribing when the first symptoms are evident, cannot be overemphasised. Dozens of cases of this kind have been brought to our attention. The men are more and more taking the doctor into their confidence, and he is teaching them, in many ways, how to live better physically.

The Work of the Nurse

During the past year our nurse made 989 personal calls in the homes of our employees, all of which were made on account of illness or accident to employees or their families. It would be impossible to enumerate at this time the far-reaching results of a work of this kind. From the mission of helping to soothe the pains of a sick baby or consoling the sorrow of a mother discouraged, to that of the work of a truant officer in finding whether the employee reported ill is really sick or away on a fishing or hunting excursion, the diversity of this nurse's duties may be realized.

We have many calls from the homes of our employees on account of illness of the wife and children. It was quite common for some of our most valuable men to be away from work on this account. Now, instead of the men going home, the nurse is sent. Nine times out of ten she can be of far more assistance than could the father, and this not only saves the time the men would otherwise lose, but is also a great advantage to the company in having the men at work.

Then, too, the nurse's work among our women employees is valuable. What the doctor is to our men, the nurse is to our women. They have learned to confide in her their troubles, and she is constantly being called upon for advice and service.

Another place where the nurse's services have proved to be of financial value is when an employee is injured and is away from work; she is then a medium of goodwill and interest. Her assurance that the company will deal fairly and squarely with the injured man has many times made the ambulance chaser's prospects look slim, and out in Ohio, where our liability laws are so much one sided, employers from that State will realize the force of this.

Just at this point in the dictating of this paper, the writer's attention has been called to the absence of an employee who has been reported sick for two days. He was one of two men in our employ who could do a certain work better than any one else. There was a rush order of rather unusual size to be completed on a certain date subject to penalty. The foreman had some question as to the reality of this man's illness, and the nurse was sent to investigate and do what she might in helping him recover. The result of her visit revealed his absence to be not due to illness, but rather to his enthusiasm and interest in a bowling contest that was being pulled off in a certain alley in the neighborhood. It may not be necessary to mention that he reported for work that afternoon.

And so we might speak of many other ways in which this nurse is a valuable factor in our plant, but time will not permit.

Provisions for Employees' Comfort

Another example of labor efficiency betterment being a good investment from the standpoint of business is illustrated in a portion of our electrical department where some 50 girls are employed. When we first began to employ girls we did not have a desirable rest room where they might eat their lunch and rest during the noon hour, and although the work was not hard and such that they could make good wages—above the average for women—we experienced great difficulty in keeping them. It occurred to us that if an attractive and well-furnished room was provided in which they could spend the noon hour in reading, resting and social intercourse, it might help solve the question of why the girls were so often leaving our employ. We did this and in less than one month a 50 per cent. increase in permanency resulted, until now it is only a rare case in which girls can be induced to leave us. In fact, so attractive is the environment in which they work that we constantly have applicants waiting for a vacancy to occur in order that they may have a chance of filling it.

Until about two years ago there was no place in our factory to which the male employees could go to smoke or read during the noon hour. As smoking was prohibited within our factory gates, owing to the danger from fire, employees who wished to smoke were compelled to go into the street, or, in disagreeable weather, to the corner saloon with all its undesirable surroundings. We reasoned that if a man wanted to go to the saloon it was perhaps his own business; but if one of our employees wanted to smoke he ought not to be driven to the unwholesome atmosphere of the saloon to do so.

The writer suggested the need of a clubhouse, and did not have any difficulty in getting a meeting of the employees to talk the matter over. A committee was appointed to take the matter up with the company. The result was that the management secured an adjoining residence to our plant and fitted it up as a clubhouse for the employees. All the latest magazines, both popular and technical, are provided, together with reading and writing facilities, card tables, &c. These rooms are filled every noon hour, and are now patronized to the extent that they are not nearly adequate to accommodate the members who go there each day. One especially encouraging result of the establishing of these clubrooms was that shortly after they were opened one of the saloons in the immediate vicinity went out of business, and, although several attempts have been made to reestablish it, none of them has been to any degree successful.

A Restaurant and Dining Room Provided

A recent and exceptionally successful feature of our industrial betterment work has been the introduction of a thoroughly equipped restaurant and dining room. About six months ago we found in one of our buildings, rather well adapted for this purpose, about 2000 sq. ft. of floor space that could be inexpensively fitted up for such use. A committee of employees was chosen to manage it, the purpose being to give the very best service for the lowest possible cost; and, although failure was predicted by many, we have gone right ahead for six months giving excellent service at a most reasonable cost. Everything to eat is of the home cooking variety, and for a cost of from 10 to 20 cents a good warm meal, served in the most wholesome surroundings, can be secured. Between 300 and 400 are served each day, and our capacity is being strained to the point where we will soon be compelled to provide larger quarters.

The company does not contribute anything to this except to furnish the room and light and heat. All help is paid for out of the receipts, and we are laying away a few dollars each week for improvement and depreciation of equipment. We installed one of the best phonographs we could buy, together with a variety of records ranging from Caruso and Melba, to a few of ragtime sentiment. The latter, we are glad to say, have not met with approval, and we find there is greater demand for the very best selections of vocal and instrumental music by the great artists.

It is interesting to see how the men will wait and listen to the strains of uplifting music until the last minute before the whistle blows; and we cannot help but feel that they return to their machines with a much better mind and heart attitude than if they had spent that time in the contaminating surroundings of the neighborhood saloon.

Helping Employees to Save Their Earnings

Acting on the theory that a community is the most prosperous whose working people have the most and best home life, and that the most and best home life conduces to the highest wages, the best education and training and the greatest prosperity of a community, we have recently started a movement toward the establishing of a Building and Loan and Savings Association among the employees.

We believe that we should assist in every way that we can, without touching the border line of paternalism, to help our employees learn to save their earnings. We are convinced that it is not so much the intense desire to squander, as it is perhaps the lack of an immediate opportunity to save, that men do not save more. Saving money is largely a matter of realizing its importance, and if we can help foster any agency that will encourage this sentiment among our employees, we believe it is our duty to do so.

This is a point for financial consideration on the part of employers. While there is perhaps no exact method of determining the loss in dollars and cents due to the constant changing of employees, we are convinced that it is of such magnitude as to add a considerable increase to the cost of production. And not only is this expensive to the manufacturer, but we believe in most cases it is unprofitable to the employee. No matter how competent or skilled the workman, there is always a loss to the employer when, a new employee begins work. Adjustment to the new methods of working takes time, and this is bound to mean loss. We could cite many instances where employees have been induced to leave our employ for the small sum of 2½ cents per hour increase in rate to go to a distant city with their families at a great expense, only to find the job to be temporary. In most cases these moves have meant loss not only to the employees themselves, but also to the company. If the workmen owned their own homes or were endeavoring to, it would not be so easy for them to leave, and hence the gain to all concerned.

While it is too early to prophecy to what extent an institution of this nature can be made successful; yet, judging from the interest and enthusiasm manifested on the part of employees, the outlook is most encouraging. We believe the plan can be made a potent factor in not only helping the employee save his earnings through which he may get a home of his own, but that it will be most profitable to the company in establishing a more permanent constituency of desirable employees.

Labor Efficiency Betterment Pays

Now, I have enumerated some phases of labor efficiency betterment which have seemed to us sufficiently important to take up as a permanent feature of our business. As we said at the beginning of this discussion, we have done so step by step, believing that it is good business, and never once allowing our employees to have any other impression. That we have been reasonably successful is not due to the fact that we have attempted anything unusual or extraordinary. We have taken up those things which have seemed to us could be made better, and in a quiet and unassuming manner have succeeded in getting results.

Now the question is asked, "After all, does it pay?" Our own experience answers emphatically in the affirmative. Mutuality is far-reaching. It includes something more than merely business success, for it affects the moral and material welfare of any community.

We may rightly emphasize the good business of any such policy; but after all there is an element of sentiment interwoven through all the industrial fabric, the absence of which would be seriously felt. A business policy that absolutely ignores all feeling of sentiment is not desirable. There are contributary causes for business success, and they are fostered by a system of management which recognizes in every one of us a closer tie than that which can be measured by any pecuniary relationship. The dollar does purchase perfunctory service, but it cannot and never will secure of itself loyalty and good-will.

Summary of surgical and medical cases taken care of at the factory hospital of the Jeffrey Mfg. Company, Columbus, Ohio, for the year ending October 31, 1910:

Surgical:	
Original cases	4,266
Redressings	4,291
Infection	47
Medicinal:	
Coryza (colds, la grippe, &c.)	620
Indigestion	418
Headache	370
Cramps (of stomach, dysmenorrhœa, &c.)	305
Sore throat (tonsilitis, pharyngitis)	251
Inflamed eyes (conjunctivitis)	143
Constipation	123
Toothache	90
Diarrhœa	87
Boils	62
Rheumatism	54
Special advice	36
Diseases of skin (eczema, ivy poisoning)	29
Neuralgia	25
Nausea	20
Biliousness	19
Hoarseness	16
Lumbago	15
Bronchitis	12
Congested kidney	12
Hemorrhoids	8
Earache	8
Ill effect from heat	6
Nervousness	6
Heartburn	6
Backache	6
Felon	5
Congested liver	4
Asthma	3
Jaundice	3
Carbuncle	3
Dizziness	3
Hives	3
Ulcerated teeth	3
Pleurisy	2
Heart trouble	2
Epilepsy	2
Sick headache	2
Nasal catarrh	2
Measles	2
Nose bleed	2
Cystitis	2
Total	11,394

Germany's Steel Production in 1910

The statistics of steel production in Germany and Luxemburg in 1910 are as follows, in metric tons, with comparison with 1909:

	Number of works producing.	1910.—Tons.	Number of works producing.	1909.—Tons.
Acid Bessemer ingots	3	171,108	3	151,148
Basic Bessemer ingots	24	8,030,571	27	7,517,451
Acid open hearth ingots	13	140,189	14	228,798
Basic open hearth ingots	64	4,973,569	60	3,844,139
Acid castings	45	111,959	42	83,014
Basic castings	41	151,852	36	123,442
Crucible steel	24	83,202	24	84,069
Electric steel	13	36,188	8	17,773
Totals	119	13,698,638	115	12,049,934

The doubling of the 1909 output of electric steel last year is an interesting feature of the statistics. This result was apparently somewhat at the expense of crucible steel. Acid open hearth steel fell off considerably. The significant feature of the table, however, is the very large increase in basic open hearth, amounting to nearly 30 per cent.

The Colonial Iron Company, Riddlesburg, Pa., will install in connection with its new blast furnace stack a complete new stock handling equipment, including skip hoist and bins. Frank C. Roberts & Co., Philadelphia, Pa., are the engineers.

Employers' Liability Insurance

The Report of the National Metal Trades Association Committee

A valuable report presented at the convention of the National Metal Trades Association; Hotel Astor, New York, this week, was that of the committee on Employers' Liability Insurance. The chairman is William Butterworth, of Deere & Co., Moline, Ill., and his associates are George F. Steedman, Curtis & Co. Mfg. Company, St. Louis and Henry D. Sharpe, Brown & Sharpe Mfg. Company, Providence, R. I. The report covers 94 printed pages of a pamphlet 5½ x 8½ in., and is not only a comprehensive but an able document. It traces the progress made in dealing with industrial accidents and in compensating employees and their dependents. Legislation in Great Britain and Germany is reviewed, as well as the practice of industrial companies in both countries. Coming to the United States the report takes up the legal aspects of the subject and describes the modifications made by the State laws recently adopted and those proposed by the commissions in other States. The plans for relief adopted by the United States Steel Corporation, the International Harvester Company, Deere & Co., and the ideas advanced by labor organizations and associations of employers as to the best methods of dealing with the question are discussed.

The Rate of Compensation

Considerable space is given to the compensation rate and quotations are made from the reports of the various State commissions. The New York Commission made an extended investigation into this branch of the subject. Data were secured from 52 firms employing about 29,000 persons and a study was made showing the actual cost of accidents in the year 1907 and the cost under a compensation scheme which allowed three years' earnings in case of death and half earnings during disability, making up the loss of wages where partial disability reduced the earning capacity. The New York report concludes that the figures afford strong evidence that large manufacturing concerns could pay compensation on such a scale as that used in the New York report, which is fully equal to the present English system, at no greater cost than many of them are now actually incurring for accidents, and probably in some cases for less. It is assumed that this conclusion should not be made to apply to small employers.

The committee says concerning contributions by employees to the compensation fund that no way has been found of bringing this about by legislation. While the example of Germany and Austria in obliging a workman to devote a fraction of his earnings to an accident fund cannot be followed in the United States, the committee suggests that this may be left as a matter of contract between the employer and the employee. The committee favors a contribution by the employee, not so much to relieve the employer of a part of the cost, as to increase the compensation, and give the employee more independence and a greater interest in the plan.

Employers and Employees Should Have a Choice

The question of the classification of industries according to risk is one which, the committee thinks, merits great consideration. A mandatory statute made applicable to all employers might be held unreasonable by the courts since a large number of small industries involve no particular hazard. Any safe legislation, though compulsory in form, must be elective in fact, and should embrace all industries, though it might be that a limitation of the act to industries employing more than a specified number of men would be approved by the courts. The report adds that any bill drafted should reserve to both employer and employee their rights at common law, but providing as to the employer that if he pursues his common law remedies and refuses to make settlement of compensation under the act, his common law defenses shall be limited (the limitation to be fixed by the act), and with the further proviso as to the employee that he shall be presumed to have accepted the compensation plan unless he expressly contracts to the contrary; and that any acceptance by him of compensation at common law shall bar him from all benefits in the compensation provided in the act. Or it might be made elective in form, with the same penalties to follow an election not to pay the compensation provided.

Voluntary Associations of Manufacturers

The conclusion of the committee is that while it might seem desirable to compile a bill which would meet the approval of the association it would be very difficult to do this in a way that would be acceptable to the various States in which the membership is found. The committee, therefore, contents itself with referring to the proposed bills in the States now having the subject under consideration by commissions or legislative committees. The suggestion is made, however, that voluntary associations be organized in the different National Metal Trades' Association districts, each member to contribute his fair proportion to a compensation fund of such a size as properly to take care of all accidents and sickness among the employees.

Manufacturers' Experience with Accident Insurance

In connection with the report several pages of statistics are given gathered from a list of 200 manufacturers. Out of 176 replying 20 per cent. reported that they depend on some form of accident or liability insurance for protection; 43 per cent. said that they employ the usual precautions, such as protecting exposed gears, saws, belts and other dangerous parts; 7 per cent. claimed to employ some forms of insurance and also to adopt the usual safety appliances. To the question "Do you carry liability insurance?" 87 of the replies were in the affirmative. Out of 197 manufacturers replying to an inquiry concerning employees' aid associations 51 companies, or 26 per cent., reported such associations, but only 15 per cent. of those having associations said that membership is compulsory. Out of the 51 companies 29 do not contribute to the support of the association. The remaining 22 contribute in divers ways and varying amounts. Concerning insurance benefit systems, 192 replies were received. Of this number 26 companies, or 14 per cent., claimed to have adopted some insurance system. Out of the 26, 62 per cent. cover sick benefits, 80 per cent. pay death benefits, and 80 per cent. require employees to contribute. Only 5 companies out of 190 replying to the question on pension systems reported such systems in use.

Out of 162 firms reporting as to records of accidents, 62 per cent. said that they keep such records. Thirty-eight per cent. do not keep such records except of notices sent to insurance companies. Reports from 34 manufacturers show their combined cost for accidents in one year to be $22,333, at an average cost to the company of $656.86. Another group of 192 accidents cost seven companies $3256. One company paid in one year for 271 accidents and one accidental death $3258. An inquiry was sent as to membership in local mutual insurance associations organized by the manufacturers. Of 176 companies replying only 6 belonged to such mutual insurance associations.

Judge Holt in the United States Court has rejected the bid for the assets of the J. B. & J. M. Cornell Company on several grounds, among which are that it did not offer to pay the receivers, A. Gordon Murray and Michael Blake, anything for their services or expenses, left them without means to carry out contracts not included in the bid, and that the court had no power to compel non-assenting creditors to accept the terms offered to them. If no other bid is made an order will be entered directing the receivers to turn over the property to the trustee, that he may proceed in the liquidation of the estate.

William E. Hill & Co., Kalamazoo, Mich., manufacturers of saw mill machinery, are now making steel castings with a 3-ton Fischer converter.

The Influence of Manganese on Soft Steel

In *Metallurgie* for January 8 and 22 is an important paper on "The Influence of Manganese on the Properties of Low Carbon Steel" by George Lang. The author briefly reviews the literature of the subject, dealing with percentages of maganese up to 3 per cent, and finds little agreement in the results of various workers.

The manganese used in the preparation of the samples was made by the Goldschmidt process and contained only 0.2 per cent. carbon; the manganese content was 95.17 per cent. The requisite amount was melted in a small crucible and metal from an electric furnace, with about 0.1 per cent. carbon, poured in; the whole was thoroughly mixed. The metal, weighing about 100 lb., was poured in a sand mold 3.93 in. square, the casting being upright. As soon as possible it was removed and cooled in the air. To get away from the influence of segregation, the upper 50 per cent. was cut off, leaving about 50 lb. of metal. The manganese loss was about 10 per cent. The ingots were carefully heated and rolled to round bars 1.18 in. diameter, and part of this was drawn into wire of 0.236 in. diameter for electrical and magnetic tests. Drillings were taken from both ends of the rolled bar, and gave the following average results:

Table 1.—Analyses.

No.	C.	Mn.	S.	P.	Si.	Cu.
1	0.109	0.285	0.046	0.063	0.319	0.131
2	0.125	0.440	0.050	0.067	0.286	0.164
3	0.126	0.675	0.046	0.067	0.303	0.167
4	0.099	0.785	0.052	0.040	0.311	0.123
5	0.098	1.020	0.049	0.041	0.316	0.140
6	0.100	1.270	0.045	0.099	0.313	0.146
7	0.101	1.315	0.047	0.102	0.303	0.141
8	0.102	1.765	0.056	0.103	0.309	0.152
9	0.099	1.835	0.059	0.108	0.324	0.126
10	0.090	2.230	0.058	0.102	0.301	0.129
11	0.092	2.470	0.051	0.110	0.294	0.125

The silicon is high, but practically constant. It is present because the original metal was intended for steel castings. The results of testing the rolled bars are shown in the following table:

Table 2.—Untreated Material.

No.	Elastic limit. Pounds.	Ultimate stress. Pounds.	Elongation. Per cent.	Reduction area. Per cent.	Nick test.	Brinell hardness.
1	46,082	62,581	27.8	53.5	23.2	119.0
2	47,647	64,909	29.2	62.5	29.4	115.4
3	49,781	66,279	29.4	63.9	28.1	115.0
4	49,283	64,572	27.8	65.9	33.4	118.6
5	51,629	68,128	28.6	64.2	31.8	123.2
6	54,332	71,399	27.9	68.1	26.4	132.4
7	54,047	71,257	28.0	67.7	34.0	133.6
8	57,959	82,493	25.9	54.7	25.1	156.2
9	58,457	84,982	26.0	46.7	23.6	162.0
10	61,017	92,734	21.2	43.4	9.5	198.6
11	63,435	102,975	18.8	39.4	2.7	211.0

The nick test was carried out on a piece planed out of the round, 10 mm. square and 100 mm. long. The nick was 10 mm. deep, its radius being 2 mm. The results are given in kilogram meters per square centimeter.

In the next table are given the results on annealed bars. The annealing consisted of heating to 900 degrees C. in a gas muffle, for one hour, and cooling very slowly under Kieselguhr. The Brinell hardness test was made at a pressure of 3000 kilograms, and with a ⅜ in. ball (9.525 mm.).

Table 3.—Annealed Steels.

No.	Elastic limit. Pounds.	Ultimate stress. Pounds.	Elongation. Per cent.	Reduction area. Per cent.	Nick test.	Brinell hardness.
1	43,238	56,892	31.5	70.0	30.8	113.4
2	43,593	57,603	30.5	66.8	30.6	115.8
3	44,376	59,452	30.2	70.0	31.0	115.4
4	45,087	59,737	30.2	70.1	32.1	117.8
5	45,514	61,159	30.7	71.8	37.2	123.4
6	46,651	64,999	30.2	72.6	43.3	131.8
7	47,718	65,852	29.8	70.3	44.0	134.8
8	48,358	73,960	27.4	72.3	41.6	158.7
9	49,212	78,511	26.2	66.7	37.5	164.5
10	49,923	92,023	18.7	60.6	24.3	198.0
11	52,270	108,237	15.3	53.1	13.9	218.4

In the following table are given results on quenched steels. The bars were heated as before in the muffle for one hour; then quenched in water at 15 degrees C., with constant agitation.

Table 4.—Quenched Steels.

No.	Elastic limit. Pounds.	Ultimate stress. Pounds.	Elongation. Per cent.	Reduction area. Per cent.	Nick test.	Brinell hardness.
1	42,953	78,795	19.6	61.0	23.6	146.5
2	46,936	82,493	19.2	62.0	27.0	165.0
3	48,643	84,200	16.0	62.2	29.4	154.2
4	49,638	84,485	14.1	56.1	30.0	157.4
5	54,261	96,859	15.5	53.0	27.2	179.0
6	63,008	107,810	15.2	48.2	18.4	230.2
7	66,137	111,224	16.3	47.8	18.1	237.0
8	85,694	155,031	9.0	44.6	14.8	273.6
9	89,178	157,164	6.7	41.7	14.5	288.8
10	91,027	164,560	4.9	26.6	12.3	326.0
11	92,307	166,551	3.1	18.9	11.7	144.42

Discussion of Results

The results show that the average effect of the manganese in raising the tenacity in low carbon steels is 2135 lb. per sq. in. for each 0.1 per cent., manganese. This applies up to 3 per cent. of manganese, but if the results are plotted it is seen that the influence is greater, the higher the manganese percentage.

The elongation in the unquenched steels is practically unchanged up to 1.8 per cent. manganese, and amounts to over 25 per cent. As the manganese increases it falls to 15 per cent. with 2.5 per cent. present. The quenching brings about an important decrease in the elongation. The contraction of area in the unquenched steels begins to fall when 1.3 per cent manganese is reached.

The tensile tests in general show an increase in tenacity and a decrease in ductility with increasing manganese. This continues up to the limit of manganese reached. It is otherwise with the nick tests, which measure the brittleness. These results increase to a maximum and then fall. In the untreated material this maximum is reached at 0.8 per cent.; it then suffers little change up to 1.8 per cent., when it begins to fall rapidly. The annealed steel shows the maximum when 1.3 per cent. is reached, then up to 1.8 per cent. the change is small, after which it falls rapidly.

The hardness as shown by the Brinell test increases very quickly in the unquenched steels with increasing manganese. The quenching brings about still greater hardness.

The steels were very thoroughly tested with regard to their magnetic electrical and microscopic properties, the results being given in full in the original paper. A bibliography is given and the paper is illustrated by many curves.

G. B. W.

The Canada Steel Company, Hamilton, Ont., will have its mill completed and in operation some time this month. It will reroll old steel rails, producing steel bars, small angles for bedsteads, &c. The statement is made that the company has enough orders booked to keep the mill at work, double turn, for several months. The raw material which it will use is scarce at present, owing to the large employment of old rails for the laying of temporary tracks on branch lines of Western railroads. The president of the company is F. W. Baillie, Toronto; vice-president, R. M. Bertram, Toronto; managing director, W. M. Currie, Hamilton.

The Steel Company of Canada, a consolidation which took over the Montreal Rolling Mills, the Hamilton Iron & Steel Company, and the Canada Bolt & Nut Company, has issued its first statement, which is for the six months ended December 31, 1910. It shows profits of $783,664. The balance after depreciation, fixed charges and preferred dividends is $245,918, being at the rate of over 4 per cent. for the year on the $11,500,000 of common stock. The company wrote off $104,071 for depreciation; fixed charges amounted to $206,305, and preferred dividends were $227,370.

The midsummer meeting of the Society of Automobile Engineers will be held at Dayton, Ohio, on Thursday, Friday and Saturday, June 15, 16 and 17. Aviation events and sociability, including the entertainment of the wives of attending members, will be features of the meeting.

The Exploration of Cuban Iron Ores*

Characteristics of the Moa Deposits—The Cost of Mining and Delivery in the United States

BY DWIGHT E. WOODBRIDGE, DULUTH, MINN.

During April, May and June, 1910, I was in charge of an examination of the greater part of the Moa iron ore area in Oriente Province, Cuba, on the north coast, near the east end of the island. My instructions, on arrival at the properties, were to check former estimates of tonnages and grades, and to re-examine the ore comprised in claims covering 44,727 acres. This work included the running of lines dividing the properties into co-ordinate planes, the boring of many thousand feet of holes spaced at the intersections of these co-ordinates, the taking of samples of the ore penetrated, the analysis of these samples for their various constituent minerals, and the determination of the results as to tonnages, depths and grades, both for individual properties and for the entire group. Each section of every one of the thousand holes drilled was to be compensated for depth and grade with every other, a series of simple arithmetical calculations of no slight magnitude, the mere mechanical labor of which consumed much time, but finally resulted in giving a complete average of all the essential facts for the entire area of 18,000 hectares.

Fig. 1.—A Drag Line Excavator at Mayari, Showing Radius of Action.

Moa and Mayari Ores Compared

Articles descriptive of the discovery and development of a tonnage of 600,000,000 tons of commercial iron ore in the Mayari field by the Spanish-American Iron Company have been published from time to time. Subsequent to these discoveries and their exploitation, the red soil at Moa was recognized as an iron ore and researches were immediately instituted to determine the quantity and quality of this ore. These investigations commenced in 1906, and had been carried on almost continuously with a varying degree of vigor up to the time of my own examination in 1910. The tonnages of this new district proved to be greater than those of Mayari, while the quality was found to be quite similar. The resemblance in grade was but natural, since the origin of ore in these two fields was precisely the same and the breaking down of the ore bearing rock has proceeded at Moa in a manner analogous to that process at Mayari. More than 50,000 acres of land were examined and drilled, the district was mapped, and thousands of drill samples were analyzed. It was found that the general area of these Moa fields was superposed upon about 60 square miles, and that the ore beds extended directly to the Atlantic shore, forming a blanket more or less continuous from the sea to the summit of the island, the hight of land between the Atlantic Ocean and the Caribbean Sea.

A precipitous range of rugged hills is practically continuous along the north coast of Oriente Province. These hills attain an altitude of from 2000 to 2500 ft., and, approaching by sea, form the distinguishing feature of the landscape. At points the slopes reach the water's edge, elsewhere they are some miles from the shore. Numerous bays break the coast; some large enough for harbors for ocean-going ships, while others are constricted in area and shallow in depth. A series of coral reefs extending for many miles along the coast protects it from the constant sweep of the Atlantic surge, which is hurled in by the steady northeast trade winds. Occasionally these reefs are cut by broad and deep entrances, easily distinguishable by the break in the otherwise uninterrupted line of white water that is like a foamy stripe, elongated on either hand until it ends, a mere ribbon upon the blue. These reefs, awash at low tide, are covered at high tide, and so perfect a protection do they form that the decrepit, poorly rigged, flat-bottomed fishing boats of the natives are safe inside, no matter how fiercely the combers may smash upon the reefs beyond.

The *ciudadcita* of Baracoa is 35 miles east of Moa, and its history extends back to the time of Columbus, for it was here that he first landed on Cuban soil. The town was founded in 1500. To the west, 50 miles, is the capacious Bay of Nipe, where are situated the works and shipping piers of the Spanish-American Iron Company, the sugar mills of the United Fruit Company and a terminus of the Cuba Railway. Between Baracoa and Nipe Bay there are no settlements worthy the name—only an occasional fisherman's hovel, where a coacoa palm grove comes down to the sea, or where there are a few roods of cultivable soil. So much of the scanty earth along this stretch of coast is iron ore that arable ground is hard to find and is in high request.

Roads scarcely deserve the name in this section of Cuba. While there is the *Camino Real*, the so-called King's Highway, it is impassable for wagons, and from Moa to Baracoa a pack mule cannot get through, even with an empty saddle. In seasons of high water the roads to Sagua and on to Nipe Bay cannot be traversed at all, and communication is almost entirely by boat. The poor transportation increased the difficulty of securing provisions and supplies, of getting and keeping competent men and of handling the mails.

No Stripping Necessary

No surface of soil exists over these ores; indeed, the ore itself is the soil, upon which grow either pine forests or a characteristic tropical jungle. On the lower elevations and in the better drained of the upland interior, pine predominates; inland, where the rainfall may be heavier, and wherever it remains more permanently after falling, the verdant jungle enters. It closely resembles the jungles of northern South America, with its tough, cordlike creepers, its strange arboreal growths, and its dense poisonous and prickly shrubbery. It is hard to penetrate unless one has in his hands that omnipresent weapon, the machete. In the belief that a thin capping of surface soil and humus might lie above the ore in these jungles, I took a number of samples in these

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woods at varying depths, which showed on analysis that, when found at all, the ore extended to the surface, whether timbered or not. No stripping of these ore bodies is necessary to fit them for mining, and during the dry seasons a lighted match may be applied to the forest floor, and the fire will clean off all organic matter above the ore, leaving it free and fit for immediate mining by the steam shovel or other means of excavation.

Scattered about the surface of these deposits are boulders, flat sheets, pellets and nodules of hard iron ore, somewhat dehydrated, and varying from masses of many tons to pieces the size of minute bird shot. Natives call the pellets *tierras de perdigones*, or "shot soil," a name warranted by their appearance and by the use to which they sometimes have been put, both in peace and in war. While the upper inch or two is occasionally composed entirely of this material, it is usually carried in a matrix of soft ore, and it was the original design at the time of discovery to wash this hard ore from the surrounding red soil and ship a product of indurated iron ore. This scheme, however, was impracticable, owing to the expense of collecting the hard ore, which is spread over a great area in a comparatively thin layer or appears in isolated deposits and pockets; moreover, the matrix contains so much clay that washing was slow and difficult. During the course of experiments having in view the washing of this material, it was found that the soft ore matrix was as good ore as the hard, and it was not until this fact was fully realized that the great size and vast importance of these deposits were appreciated and their possibilities realized.

Not a Sheet Formation

It has been considered by some engineers that these shot ores cemented into masses occur in layers and bedding planes, and so form a persistent sheet covering a large continuous area. In proof of this they point to the hard boulders frequently found underground in the progress of drilling operations. Basing my opinion on the results of a drilling campaign greater than that of any concern aside from the Spanish-American Iron Company, at the Moa and Mayari properties, I cannot agree with this theory. I believe the hard ore found underground in drilling to be blocks and boulders of this cemented material, and not often of large size; also, that the horizontal outcrops of cemented nodules, at times found along the sides of erosion canyons, are not original, but have assumed their present condition since they became subject to the changes incident to surface action. And this is the case whether they are directly upon the top of the ground or near to it. Contrary to statements made in occasional reports, there are in these deposits no definite layers of ore of varying degrees of induration, color or class. The deposits are homogeneous masses, and the harder ores found so frequently are the result of heat, the action of the elements and the infiltration of iron salts as a cementing material; while the variations of color and texture are the result of a more or less hydrated condition and a more or less complete disintegration of the original rock, all due to local favoring or retarding causes. I took careful note of the depth reached by nodulized ore and found it to average a few inches, while the extreme depth was 24 ft. This latter depth for nodules was rare; in such cases their proportion of the mass was very slight.

Depth of the Ore

The deposits constitute a surface mantle varying in thickness from a mere film to 121 ft., which, I believe, is the extreme depth ever drilled in ore in Moa. This hole was bored by men in the employ of the Juragua Iron Company. The greatest depth which I attained was 81 ft., said to be the second deepest ever bored there, and the deepest ever put down by an ordinary crew of two men. There is an average thickness of from 18 to 20 ft. The results of work under my supervision, covering an area of more than 8000 hectares of ore drilled, showed an average of 18.83 ft. Mayari ore, I understand, is a trifle thicker. The thickness of the ore mantle is affected by local causes, assisting or delaying the breaking down of the serpentine rock (which experts agree to be the mother of this ore), erosion by streams and other causes. The ore lies directly upon the serpentine, and mining will be somewhat unfavorably affected by the fact that the gradation from ore to rock is not at all regular, but very rough, so that in cleaning the bottom of an ore body with any sort of automatic machine, chunks of serpentine are liable to be broken off and lifted with the ore, unless care is constantly exercised. This irregularity is shown plainly at the mines of Mayari, and shipments from these openings to Nipe piers sometimes contain serpentine broken from the floor.

Torrential mountain streams are frequent in this area. A square of 225 hectares was measured for check work in which were no less than three large rivers with deep gorges, each one worn well into the underlying rock. In this particular area about 25 per cent. of the total was barren of ore. But while there are many streams, this special case was abnormal and cannot be duplicated in the entire district. In spite of a brief rainy season and a long dry period, waters flow with surprising volume throughout the year. But erosion at the present time is exceedingly slight and entirely negligible so far as tonnage of ore is concerned, for the *arroyo* slopes are hard and smooth, and, even in flood, the rivers bear comparatively little material in suspension.

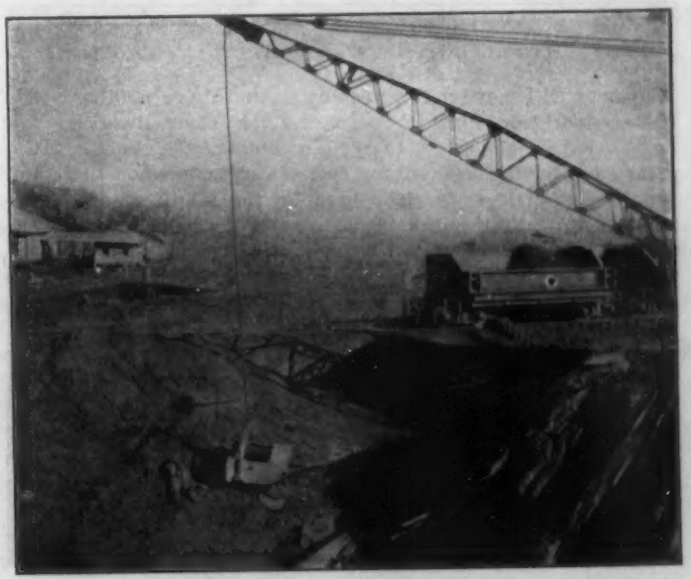


Fig. 2.—The Drag Line Loading Ore Cars at Mayari. Cars Used Here Are of 50 Tons Capacity and Are Side-Dump.

One peculiarity of this ore is that it stands indefinitely without caving. On exposed vertical faces, open to storm and sun, there is no appreciable sloughing off of the sides. I have seen pits dug years ago, that have been open to the action of the weather, the vertical walls of which still retain marks of picks and other tools of the diggers. This ore is very clayey, representative and composite assays showing Al_2O_3, 13.34, and SiO_2, 3.36 per cent. Derived, as it undoubtedly is, from serpentine, the proportion of alumina is naturally very high.

Method of Exploration

By reason of the character and condition of these ores exploration can be carried on by a process that is simple, accurate, rapid and cheap. Ordinary 2-in. auger bits are forged on one end of 4-ft. sectional rods, the other end being fitted to receive a sleeve nut, 5 or 6 in. long, into which another 4-ft. section may be screwed. As a hole is driven down by the auger bit additional threaded sections are screwed on the rod, making it any desired length. On each end of each rod, except where the bit is shaped, is a backing nut screwed down hard, in order to prevent the rods from working too tightly into the sleeve nuts when turned into the resisting ground, which would

render it difficult to release quickly. In most cases ore can be bored by this simple tool with comparative ease, and when hard blocks and boulders are encountered underground, they are sometimes cut by the substitution of a cutting chisel bit for the auger point; in other cases

Fig. 3.—Ore Excavated, Showing Rock Boulders on Floor.

the men will move a few feet away and drive another hole, experience having shown that a very short distance will usually be sufficient to avoid a boulder. The hole is started through the drier top soft ore or nodules on the surface, a little water is poured in, the bit lifted and driven down by the combined strength of two men, and then turned in the ore. The work is a combination of churning and boring. Every few feet the tool is lifted, the ore adhering to the bit is cleaned off by pressing a stick into the point of the bit and then revolving the tool, and saved for analysis, and all sludge that has collected above the bit is scraped off. If the hole is sampled in sections, all ore taken out of each section by the bit is saved to make a full sample; but if the hole is sampled as a whole, the ore is all piled upon a cloth and afterward mixed and quartered down with the ever-ready machete to make a suitable sample. When sampling was in sections it was found best to adopt 5-ft. lengths, both for general convenience and to ease the work of the calculator of averages. The drilling is hard work in deep or difficult holes, or where nodules are frequent—as hard as any labor that a man can comfortably endure. It is done almost entirely by Spaniards, mostly from the Province of Galicia, who become very expert and earn good pay. It is all task work, and the going rate of contract wages varies with the depth of holes as well as with the character of country rock. Each pair of boring men is accompanied by a water carrier and a sample marker, both paid by the day; the sample marker acts as the representative of the employer. He measures the holes and sees that bottom is reached before the drilling is stopped. The deeper the work the more difficult it is, and there is on the one hand a tendency on the part of drillers to shirk, and on the other to allow themselves extra measurements. They will stop in ore if it is hard drilling, marking *piedra*, or "rock," on their last sample, if there is no one to check them. Were it not for the peculiarity of this ore of standing without caving, this system of drilling would be impossible, and it would be difficult for the engineer to follow and check the depth of holes by dropping down a measuring rod, or by inserting a bit with which to test the material at the bottom. It is not uncommon to check grades of properties previously drilled by inserting bits in the old holes and reaming out a sample from the sides of the hole. If the original hole has been protected at the surface by plugging it with a piece of sapling, it is very unusual to find the hole caved or destroyed.

Proficiency of the Borers

The price paid the borers begins with from 1.5 to 2 cents per foot for the first 10 ft. of depth, and increases by the addition of a like sum per foot for each succeeding 10 ft. of progress following. In ordinary ground each borer will earn from $2.50 to $3 per day; in other words, a pair of borers will complete from 10 to 13 holes, averaging 20 ft. deep, per day. Sometimes, when work is unusually difficult, or when it is desirable to get special results on check work, it is necessary to pay by the day at the rate previously earned on contract, or to give some sort of bonus for depths. Working with one of these drills, two men in my employ drove a hole 81 ft. deep, although it took them two long days to complete it. This hole was drilled at a spot where I thought that the ore was thicker than the original testing, or my own first check, had shown it. The original record was 22 ft. and was marked "rock bottom"; my own check was 20 ft. and was likewise marked "rock." But the third attempt went down four times as far before it really bit the serpentine, though located less than 10 ft. from either of the others. Evidently both former holes had cut into an ore boulder that the men thought was bottom, or that they did not desire to penetrate. In the third effort to reach bottom 10 ft. of hard ore was cut by the use of a chisel bit between the 20-ft. and 30-ft. levels. A fact that was somewhat of a surprise to me, in connection with this hole, was that the bottom section, from 75 to 81 ft., showed ore as high in grade as that in any other part of the boring and slightly above the average. The borers acquire great facility, and work rapidly and hard. If the ground is easy of entry they complete the holes quickly, and race each other from one location to the next in order to lose as little time as possible. They regard themselves as of a type of laborers higher than the average, and feel pride in their occupation.

In no other way is it possible to explore such an area except at great expense and in a long time. No system of tunnels, pits or other openings is so well suited to this work. It is well enough to sink pits occasionally, to check by actual observation certain facts that seem patent from the drilling, or to answer questions that may arise. In this manner of drilling there have been bored on that part of the Moa area explored by my men more

Fig. 4.—A Trail Over Ore Soil in Pine Woods at Moa.

than 50,000 ft. of openings in ore, counting the work of original explorers and my own check work.

Regularity of the Ore Cheapens Mining

By this rapid and inexpensive method of boring the ore blanket it will be possible to determine in advance of any actual mine operation the precise quality of product to be expected from any given area, and thus to regu-

late grades won or to produce any quality within the chemical limits of the ore body. And it will be a simple matter to ascertain in advance the general topography of the underlying rock, and thus to bring mining work for years to come under an assured and definite plan and system. All this, of course, means a greatly reduced cost of mining.

To those accustomed to vein mines or to the great replacement deposits of the Mesaba iron range, borings varying from 100 to 300 m. apart may seem utterly inadequate to prove grades and tonnages. But a consideration of the origin of these fields and of their necessarily quite homogeneous character answers this objection in part. The answer is made definite and conclusive and the customary method proved safe by results secured in actual practice. In early examinations of the Mayari field original borings were spaced every 100 ft., but as the work proceeded the ore was found to be so regular in analysis, texture and thickness that holes were gradually spaced at intervals up to and even exceeding 1000 ft. There was some variation in the essentials, but the averages proved so closely as to be accepted as perfectly competent evidence. The results reached by these more widely separated borings have been since abundantly proved and confirmed by intermediate holes spaced as close as 50 ft. from each other, while in actual mine operation over the same ground shipments also check these distant original holes. My own intermediate lines, run between co-ordinates, were a further proof. Engineers and others accustomed to narrow veins and comparatively small tonnages may be startled at such figures as this work presents, secured, as these have been, on data that may seem absurdly insufficient, but study and examination will convince them of the reasonableness of the assumptions made.

One interesting peculiarity of this ore is that often its appearance is no guide to its analysis. Naturally one might expect the deep reddish soft ore to be of better grade than the coarser yellowish ore containing grains of quartz, &c. But this lighter yellowish ore, when dried at 212 degrees, is as high in iron as the heavier red colored ore, and its discovery in a hole is little or no guide to the probable depth of that hole, although it is a fact that this class of ore is found more frequently near the base of the beds than in the higher levels.

Analytical Work in the Field

It is very important, for this and many other reasons, that any serious attempt at the examination of these ore fields be assisted by a chemist in the field. About 2500 samples were analyzed during the course of my work on this examination, most of them in a field laboratory. It was impossible to maintain an equipment in the hills sufficient for the determination of chromium, nickel, phosphorus and the like, but all iron assays were made there, and were kept as close to the daily returns from the drillers as was practicable. With the crude equipment at hand one chemist, assisted by two Spanish grinders from the district, assayed as many as 50 samples in a day. Our laboratory was housed in a palm thatched hut, one side open to the breezes, with its foot thick roof inhabited by snakes, scorpions and rats, and with myriads of flies, fleas and gnats swarming about us as we carried on our calculations or weighed out our samples. The northeast trade winds that come into such a laboratory after sweeping over thousands of miles of sea are freighted with dampness, and it was found that a slight delay in weighing a dried sample caused it to absorb moisture so rapidly as to affect the results. So careful were my selected native assistants in their work of marking samples, both in the field and in the grinding shed, that of all the samples brought in for analysis less than half a dozen were unmarked or misplaced.

This limonitic ore carries an excessive aomunt of hygroscopic moisture and is light in weight, varying between 18 and 21 cu. ft. to the ton. At an average of 20 cu. ft., which has been assumed as a safe unit for computation by all explorers in that field, the ore will weigh 5382 tons per hectare-foot. When the area runs into thousands of hectares and the average depth to more than 18 ft., it may be seen readily that the estimated tonnage will give an enormous aggregate.

Chromium-Nickel Content

The presence of nickel and chromium has been noted. The former is found in quantities increasing toward the floor of the deposits. In the analyses of several hundred samples for this element the highest percentage found was 1.28 and the lowest 0.44, with an average not far from 0.80. I need not emphasize the economic importance of an iron ore averaging 43 per cent. of iron and carrying 0.80 per cent. of nickel. Several hundred tests for chromium showed an average of 1.75 per cent., a serious matter if it were not that a simple metallurgical process will eliminate this element at one stage of the reducing operation. These ores are of Bessemer grade, slightly lower in silica than the average Mesaba and not higher in kaolin than some Mesaba ores. Phosphorus exists in very slight proportion. Sulphur is negligible. At Felton, on Nipe Bay, the Spanish-American Iron Company operates a large works for the beneficiation of this ore by drying it in cylindrical, rotating, horizontal kilns heated to a high degree, which reduces by 33 per cent. the weight of raw ore charged. Against this cost of nodulization, which may be given at about $1.25 per ton of product of the kilns, are to be placed the saving in freights and duty, and the advantage to the furnaceman of receiving a partly prepared material for treatment.

Mining and Transportation Costs

With no overburden to be removed, the deposit situated close to the sea, with stream valleys cutting through the ore beds and running directly to deep water, and with an average thickness suitable for about one shovel cut, these ores should be mined at low cost by ordinary steam shovel. The steam shovel is referred to here as though its advantage for this work were unquestionable, but this is not so certain, since some other type of machine excavator may be better. The drag line excavator has been tried and has advantages, especially if the deposit or ore is comparatively thin and the floor quite rough. Also, its radius of action is far greater than that of a steam shovel, which must be moved frequently. There is no question of the relative efficiency of the two machines if the shovel can get one or two full cuts in clean ore, but such opportunities are comparatively rare. One block of 75,000,000 tons, assaying several percentages better than the average of the district and of a thickness of about 70 ft., can be connected with deep water by a railway 4000 m. long, without excessive gradients. Ore so situated can be delivered on board ship at an actual operating cost not to exceed 20 cents per ton. The average cost of mining and rail transport to the sea for the entire tonnage in sight should be but little more than this amount.

Iron ore is transported from Cuba to American Atlantic ports at 85 cents per ton. It is carried in British and Norwegian tramp steel ships of from 3500 to 6000 tons cargo capacity, usually equipped with two cargo hatches forward and two aft. These vessels do not compare with the great lake freighters of from 10,000 to 13,000 tons capacity and with from 20 to 33 hatches. To be sure, a lake ore carrier would not live in the weather to which these boats are subjected, but there is no doubt that reasonably large staunch carriers can be so constructed as to afford rapid loading and unloading at each end of the route. With a ship of this character in this trade, more money could be made at 70 cents per ton than the lake boats make at 85 cents per ton. Adding duties at 75 per cent. of the foreign import rate, incidentals, administration expense, nodulizing and all other charges, a nodulized 54 per cent. Bessemer ore can be delivered from these mines at American Atlantic ports at a cost of about 5 cents per unit of iron, and at Pittsburgh at a cost of 8 cents per unit of iron, the additional 3 cents being due to the freight from the seaboard to Pittsburgh. The raw ore can be delivered at the same points at 3.5 and 7.2 cents, respectively. Of course Lake Superior ores have a counter and equivalent advantage at Pittsburgh.

Various important steelmaking concerns are interested in the Moa region. The United States Steel Corporation has a number of men in that field; the Pennsylvania Steel Company and the Bethlehem Steel Company

are also well represented by their subsidiary companies, the Spanish-American Iron Company and Juragua Iron Company; and other Eastern and Western interests are identified with the field. No mining has been started as yet at Moa, but it is probable that operations will not long be delayed.

The Philadelphia Foundrymen's Association

A Paper on Pyrometers by Richard P. Brown

The Philadelphia Foundrymen's Association held its regular monthly meeting at the Manufacturers' Club, Philadelphia, Pa., on the evening of April 5. President Thomas Devlin occupied the chair. The Wetherill Finished Castings Company, Erie avenue and Richmond street, manufacturer of special alloy castings, was elected to membership, and an application for membership was received from Crocker Brothers, Pennsylvania Building, Philadelphia, represented by C. H. Newcomb. Appropriate resolutions were adopted on the death of Mortimer H. Bickley, president, Penn Steel Castings & Machine Company, Chester, Pa. A committee consisting of Elmer E. Brown, chairman; August A. Miller and James S. Stirling was named by the president to make the necessary arrangements for a special car for the delegation attending the foundrymen's conventions in Pittsburgh, May 23 to 26. Henry M. Lane, editor of *Castings*, Cleveland, Ohio, urged the members to attend the conventions, which will no doubt be most instructive, both from the number and scope of the papers presented as well as the exhibition of foundry appliances, the plans for which are on a most elaborate scale.

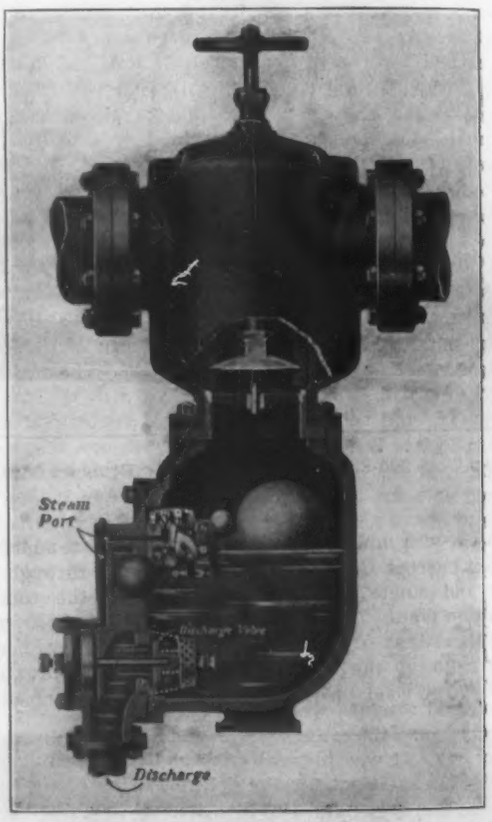
The paper for the evening's consideration was on "The Measurement of High Temperatures in Modern Foundry Practice," by Richard P. Brown, Brown Instrument Company, Philadelphia. Mr. Brown discussed the great importance which knowledge of temperature plays in the annealing furnaces of malleable iron foundries and steel casting plants. He described various devices used for measuring furnace temperatures, such as the Siemens water pyrometer, the platinum or quick-acting pyrometer, the thermo-electric or Le Chatelier pyrometer, the Mesure & Noel optical pyrometer, the Wanner pyrometer and the new Brown radiation pyrometer, made by his own company, which was illustrated and described in *The Iron Age* of December 1, 1910. He stated that he believes the time is coming when the operations of all cupolas at foundries will be controlled largely as to temperature. Experiments have been made by some concerns to regulate the cupola temperature at the melting zone by Thermo-couples installed through the wall, the inside of the couple being in a recess in the wall so as not to be struck by the material to be melted. Several works are now conducting experiments along this line which bid fair to furnish data for controlling cupola temperatures.

In dwelling on the importance of the recording instrument as an adjunct to a pyrometer, Mr. Brown mentioned the fact that a large steel works at Reading had received an order from an automobile manufacturer for a quantity of steel which was to be annealed at a specified temperature; when the steel was delivered to the customer it was not entirely satisfactory, and he did not wish to accept it, claiming that it was not annealed at the temperature specified. The steel manufacturers had fortunately kept the pyrometer records and produced these to prove that they had carried the desired temperature. To use the words of the metallurgist at the plant, "these records saved us thousands of dollars." Frequently, when ovens are fired with coal, the fires are choked by the fireman, and a bad drop in temperature occurs. At a Western malleable plant, at which recording pyrometers are used, the superintendent noticed such a drop and called the fireman's attention to the record of the pyrometer. He instructed him to be more careful in the future when firing up, and there was no more trouble from that score on future records. At some up-to-date plants the record chart of a perfect anneal is placed on the wall beside the pyrometer, and the fireman can see what temperature was carried at each hour of the previous anneal and duplicate it. This does away with all guesswork. The fireman knows exactly what heat he is carrying and the recording instrument shows the manager in the main office whether the fireman was on the job and carried out his orders all night.

In referring to the Siemen's water, quick-acting platinum, thermo-electric and radiation instruments, practical demonstrations were made by Mr. Brown in connection with an electric furnace and indicating and recording instruments. He was given a unanimous vote of thanks for his paper, after which the meeting adjourned and luncheon in the club dining room followed.

The Wyoming Automatic Eliminator

A combination steam separator and trap, which is known as the Wyoming automatic eliminator, is being manufactured by W. H. Nicholson & Co., Wilkes-Barre, Pa. This device is made in two styles for both horizontal and vertical pipe lines, the former being the type illustrated, and not only separates the moisture and the condensation from the steam but automatically discharges them as well. One of its distinguishing features is the use of a large size discharge valve which makes it almost impossible to flood the separator. The valve is operated by a steam piston and the mechanism is of the instantaneous opening and closing type, thus avoiding all wire drawing through the discharge valve. It is either entirely opened or closed at all times and is always covered by at least 2 in. of water, thus providing a water seal and preventing leakage of steam.



The Wyoming Automatic Eliminator for Separating Moisture from Steam Made by W. H. Nicholson & Co., Wilkes-Barre, Pa.

In the horizontal type of eliminator, the upper section or separating chamber is composed of a series of serrated baffle plates which divert the flow of steam. In this way all the water of condensation and the moisture in the steam collect upon these plates and drop to the chamber below where they are automatically discharged through the discharge valve. A shut-off valve is located between the upper section and the steam trap in the lower portion. When this valve is closed the main steam line is shut off from the eliminator, an arrangement which affords a very convenient way to clean out the dirt and the sediment which collects in the trap. These eliminators are made in all sizes from 2½ to 16 in. and will operate at any pressure from 5 to 150 lb.

The De Laval Turbine Reducing Gear

A New Speed Reducing Connection for Turbo-Generator Sets

For some time experimental work has been carried on by the De Laval Steam Turbine Company, 165 Broadway, New York City, at its works in Sweden and at Trenton, N. J., to develop a helical reduction gear that could be used to reconcile the high speed of the turbine with the much slower one of the electric generator. The result of this work is shown in Fig. 1, which is a view of a 500-kw. geared turbo-generator set, and in Fig. 2, which illustrates the reducing gear and the pinion used.

Quite recently the unit illustrated in Fig. 1, which consists of a multi-stage turbine driving a standard speed direct current Crocker-Wheeler generator through a pinion and single gear was completed at the company's Trenton plant. The speed of the turbine is 3600 rev. per min. and that of the generator shaft 500 rev. per min., the ratio of the speed reduction being approximately 7 to 1. A good idea of the compact nature of the construction of the turbine, the maximum capacity of which is 1200 hp., can be obtained from the engraving, the total amount of floor space required being approximately 9 x 25 ft. The main casing of the turbine is made of cast iron and is approximately cylindrical in shape. It is split horizontally, so that the upper half can be lifted to give access to the revolving and the stationary members of the turbine. This casing is supported at the same level as the center of the shaft, 42 in. above the floor, from the base plate by two pedestals, one on each side and is bolted down on one end only, which leaves it free to expand and contract in an axial direction between steel guide bars mounted on the top of the bed plate pedestals. As a thrust bearing also determines the longitudinal position of the shaft, the results of axial expansion are largely compensated for.

The generator supplied with this set is of the standard Crocker-Wheeler type, and occupies a floor space of 7 ft. 9 in. by 7 ft. 8½ in. The field frame is 68¾ in. in diameter and has eight main and eight auxiliary or commutating poles, the latter being connected in series with the armature circuit and so proportioned as to eliminate sparking through all ranges of load within the capacity of the turbine.

The pinion and the gear which are shown in Fig. 2 are the most interesting part of the unit. It will be noticed that these are of the double helical or herringbone type and differ from the standard gear supplied with the De Laval turbines but in the size of the gear and the fact that only a single gear is used for the largest sizes of turbine. The diameter of the gear is 48 in. The pinion is cut from a solid steel bar and is mounted in plain babbitted bearings supported in a rigid cast iron frame that also supports the bearings for the gear. The pinion bearings are lubricated by sight feed oilers, and the excess lubricant flows to the wells of the gear bearings which have ring oilers. The large gear consists of a solid cast iron center upon which two thick steel rings are shrunk. The gear hub is mounted on a stiff shaft which carries one-half of a flexible coupling for connection to the driven machine, while a coupling of the same type is mounted on the pinion shaft for coupling to the turbine shaft, the distance between the couplings being 6 ft. 3½ in. The lubrication of the gear and the pinion teeth is accomplished by jets of oil which are forced out under a pressure of 10 lb. per square inch through a series of pipes and nozzles at the line of contact on the entering side. The supply pipe is shown in Fig. 1 running across the gear case below the center line. After this oil has been used it passes away through the pipes coming from beneath the gear case to an oil strainer located in the base of the turbine, then through a cooling and settling chamber and finally to the oil well from which it is again pumped through the piping. The circulation of oil is maintained by an oil pump in the base of the turbine, and this pump is driven from the governor shaft of the turbine and supplies oil to the gears and to the bearings.

In the test made of this unit before shipment, the operation was found to be remarkably free from vibration and noise. The quiet running is attributed to several causes, the principal ones being the accurate cutting of the gears on a specially designed machine and an adequate supply of lubricant.

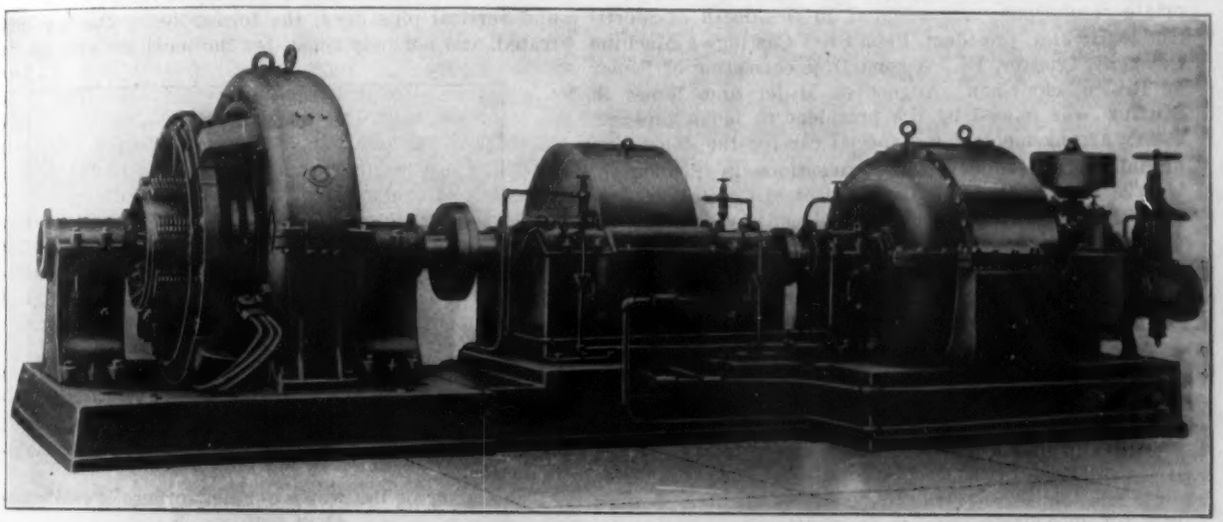


Fig. 1.—A 500-Kw. Turbo-Generator Set Equipped with a Single Reducing Gear Built by the De Laval Steam Turbine Company, New York City.

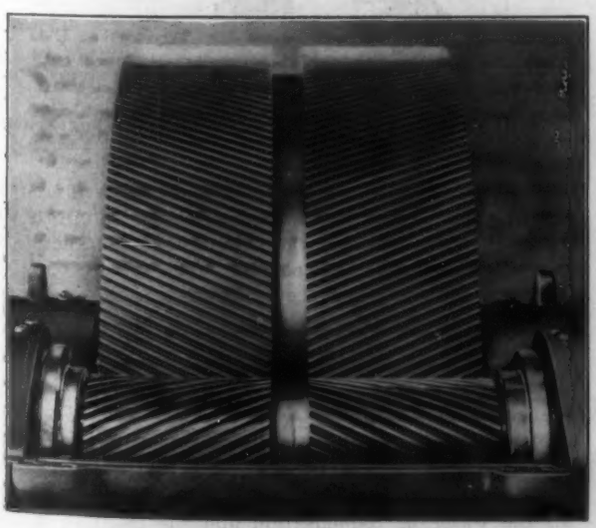


Fig. 2.—The Reducing Gear and the Pinion Used.

German Steel Trade Problems

Advanced Processes and Syndicates Lead to Overproduction

The most interesting question now agitating the German iron and coal trades is whether the two great organizations controlling them—the Steel Works Union and the Coal Syndicate—will be renewed upon the expiration of their present contracts. The former terminates at the middle of 1912, the latter in 1915. Negotiations looking toward the prolongation of the former will be taken up in earnest in the coming autumn, while committees are already doing preliminary work to prepare the ground. The *Frankfurter Zeitung* has recently devoted a series of articles—evidently from the pen of an expert who traveled over much of the coal and iron districts studying the situation—to reviewing all the conditions bearing on the prospects of the two organizations. In the course of these articles some extremely interesting paragraphs are given to general developments in the iron industry within the past few years and to the organization problem. A condensed translation of some of this matter is furnished by our Berlin correspondent as follows:

Reducing Costs of Production

All observers are full of praise for what has been accomplished in the German iron industry within a few years toward reducing cost of production. This has only been possible through the help of a well-trained staff of engineers, such as our technical universities turn out, and through the most intense detail work at every stage of production. The utilization of furnace slag, formerly a dead loss to the works, but now a rich source of profit, and the utilization of the gas that formerly escaped into the air from furnaces and coke ovens are the best known achievements in the direction of reducing production costs. What the saving of the blast furnace gases alone means—the power from which now penetrates to the remotest corner of the works—is shown by the case of a medium-sized establishment in the Siegen region, which in this way alone saves 180,000 tons of coal, equal to half of its dividends. If all the iron works were built to save the gases, the annual saving in coal would reach 2,000,000 tons. Supplying furnace gas to adjacent cities and towns direct from the iron works is as yet only in its beginning; but it is scarcely possible to say how much this will mean for them.

Fusions and amalgamations of works, rendering possible a better division of labor and a better specialization in production, have also tended in the direction of lowering costs. The result is that the West German iron industry to-day is really placed on a new price basis, as compared with even a few years ago. A different standard can be applied to them to-day; prices that would have formerly been regarded as miserably low are now accepted as yielding an actual profit, thanks to the reduction in production costs.

Some Disadvantages of This Progress

But this development has also its disadvantages. The application of furnace gas, which is making the furnace's chief function that of a power generator, and relegating pig iron to a secondary position, as a mere by-product of this power generation, prevented the works from curtailing their production as the market situation required in years of depression, inasmuch as they would have been under the necessity of reducting production correspondingly in all other departments. It is precisely the fear of such an overproduction of pig iron that causes the English to shrink from an extended use of the big gas motors.

What has occurred in the case of pig iron production has also been repeated in a general way with the great mixed works, developed under the pressure of technical progress. In other words, such establishments must keep in operation in order to secure low costs of production. Any restriction in operations means a heavy increase in those costs, since general expenditures—salaries of officials, wages of labor, coal, interest, &c.—run on undiminished. Hence an order at a price equal to the cost of production is much better for such an establishment than no order at all, since it will at least help to bear the general expenses. The recognition of this fact leads inevitably to a further expansion of plants, for it is a simple problem in arithmetic that 100,000 tons can be produced more cheaply by the ton than 10,000. That is the natural logic of the situation.

Effect of the Kartels or Syndicates

The worst of it is that this natural logic has been overworked to an unnatural degree under the domination of the kartels. It is very interesting to see that this fact is now recognized even in quarters in the iron trade which not long ago would have fought tooth and nail against such an admission. . . . It begins to be felt that there has been too much worshiping of big figures, that many of the well-reasoned fusions really subserved only personal or speculative interests, and that it was by no means an unmixed blessing for the iron trade when the big banks put huge amounts of capital for new establishments and enlargements into it, and then organized price-fixing syndicates in order to guarantee profits. Every kartel, even an association formed for the brief space of several years, carries in itself the germ for a heavy extension of plants. This fact is now recognized—now that it is too late. For we are actually already on the way that leads to disaster, the way to a heavy overproduction.

The clamor of the works for new orders is really due not merely to their need of full employment with a view to keeping down production costs, but to another special cause, namely, the wish to obtain, upon the renewal of the Steel Works Union, high allotment figures. It is hoped to get these by pointing to the magnificent figures of shipments actually already made. In other words, the fight for allotments is already raging, and the current heavy sales are only a maneuver in this fight.

Hand in hand with it goes another process—the enlargement and extension of the works. We are referring here not merely to the two great new establishments—the new works of the Gelsenkirchen Company at Esch (in Luxemburg), and the new works of Thyssen at Hagendingen (in Lorraine)—but also to the numerous smaller additions which are being erected everywhere at the older works; and we are referring to expansion in the means of production, to the rounding out of the works for making higher classes of products, and so on. There can be no doubt of the fact that the iron works are again in a high degree their own customers; they are creating work for themselves by means of their own new plants that they are erecting; and this is one reason why home production still seems to keep somewhat normal.

Great Overproduction in Sight

There can be just as little doubt that when the Union comes to be renewed in about a year—these new works and additions having meanwhile been finished and become producers instead of consumers—then the German iron and steel mills will have a producing capacity that will far exceed their ability to sell their products. Then we shall have an overproduction that can only be gradually overcome by the growth of consumption, notwithstanding the natural tendency of consumption to increase, and notwithstanding the outlet opened to us in the foreign market, which, of course, is capable of further development. This was precisely the case at the previous renewal of the Union in 1907, when the allotments in bars were suddenly increased; now the same process will have to be repeated on an enlarged scale.

This fight for quotas will be the first thing that will prove an obstacle to the prolongation of the Union. From the preliminary preparations of the works it is

evident that this fight for allotments will be carried on with all possible tenacity and energy. The fight in 1907 foreshadowed what is coming. There are establishments to-day which, although running at their utmost capacity, can hardly produce up to their allotments; but there are others that have blown out some of their furnaces and are stopping their rolls one day in the week for the reason that their allotments do not permit them to run more than about three-fifths of their productive capacity, and they do not feel able to pay the heavy tonnage penalties for exceeding their quotas. Works of this latter class will not be guilty of excessive modesty a second time.

Other Problems Than Allotments

But there are other problems. For example, the syndication of the B products (all other steel products than rails, structural shapes and semifinished material), especially bars. Will the works be able to find a form for accomplishing this, after having hitherto sought in vain for one? Or is the Union to be renewed again as a torso? Can this be thought of, in view of the fact that the sales of the B products already exceed those of the A products, and that this excess of the former is continually growing bigger? . . . Then we have the serious geographical differences. The Silesian mills have got themselves into a difficult position through their enlargements of plants, despite their relatively higher cost of producing goods. A more important matter is the competition between the Rhenish-Westphalian and the Luxemburg-Lorraine works. The former have their coal at their doors, while the latter have iron ore equally nearby. The more southerly group derives relatively a much greater advantage from the application of power produced from furnace gases, since they thus save coal, which is dearer there by reason of high freights. They do not yet undertake the higher processes of manufacture, owing to the lack of skilled workmen, who prefer to stay near the larger towns; but the Rhenish-Westphalian works no longer feel secure even of this advantage; it is probably only a question of time when the southwestern mills will also take to turning out the finer classes of products.

The writer finally takes up the question, How much interest have the works in renewing the Union? He finds that, while there is a strong sentiment in favor of the renewal, many mills point out that their interest in that direction has grown less since 1907, owing to the shifting of production to class B products, in which allotments indeed are made, but the works are left to sell their product at their own prices, and to hunt for their own trade. Nevertheless, an aggregate of 5,000,000 tons of class A products is still fully under the syndicate arrangement of the Union. The Union has offered great advantages to its members in marketing this big total, as well as in fixing a common freight basis. Besides this, the Union maintains a selling agency in London, and in one or more other markets, and these would have to be abandoned if the renewal is not effected. But the most practical advantage is the maintenance of prices; it is everywhere admitted that prices would drop 20 to 30 marks a ton as soon as the Union should be dissolved. In other words, a loss of something like $60,000,000 a year would ensue for its members.

The foundry business at Franklin Park, Chicago, Ill., heretofore carried on by Forster, Waterbury & Co., will hereafter be conducted by the Franklin Park Foundry Company, which will continue the manufacture of malleable and gray iron castings and specialties, such as steam, water and gas pipe fittings, link belt chain, carriage and wagon hardware, miscellaneous hardware, &c. The main office will be located at Herrs Island, Pittsburgh, Pa., and the factory office and works at Franklin Park, Chicago. Inquiries and orders may be addressed to either office. James P. Walsh is president; J. N. Korhumel, general manager; J. Twing Brooks, secretary and treasurer. Charles F. Forster has sold his entire interest in the corporation of Forster, Waterbury & Co. and, having resigned his position as treasurer and general manager, is no longer connected with the concern in any way.

Canada's Iron and Steel Bounties

The Government Discourages Hopes of Renewals

TORONTO, April 8, 1911.—In his budget speech April 4 Mr. Fielding, the Finance Minister of Canada, made some reference to the subject of bounties, but it was not until his speech was concluded and the House was about to go into supply that, in reply to a question, he stated categorically that "There is no intention on the part of the Government to renew them." It would appear, therefore, that on iron and steel produced in Canada after the end of June there will be no bounty paid, save on such as is manufactured by electrical process before the close of 1912.

Mr. Fielding's statement puts an end to uncertainty and to some hopes that were clung to up to the moment it was made. It is true, toward the end of the last session of Parliament he spoke to the same effect in terms that were scarcely less unmistakable. The bounties on pig iron, puddled bar and steel ingots ceased at the end of last year, and the bounty on wire rods will expire at the end of next June. There is no doubt that what Mr. Fielding said last spring prepared the iron and steel manufacturers for the discontinuance of the bounties, but it is equally beyond question that they also expected compensation in the form of protective duties. Several important staples of the iron and steel industry are either on the free list or are dutiable at very low rates. Of the former are wire rods, barb wire and Nos. 9 to 13 galvanized wire. Of the latter are galvanized or otherwise coated iron or steel sheets not thicker than No. 14 gauge, &c.

The Injection of the Reciprocity Question

After the terms of the reciprocity agreement with the United States were made known, it was manifest that the steel interests of Canada were not to be compensated for loss of bounties by increase of tariff protection. That led to the belief or hope that the Finance Minister would abandon his formerly expressed purpose of discontinuing the bounty. Of late it has consequently been freely conjectured that the Government would this session introduce legislation providing for another five-year term for the bounties. Strong but unavailing pressure was brought on the Finance Minister to induce him to do this. Hence Canadian manufacturers of steel will not have the benefit of the bounties, and they will have no further tariff protection. The very probable effect will be the passing of the Canadian wire trade largely to United States manufacturers.

Of course, if the reciprocity agreement with the United States becomes law, Canadian manufacturers of wire rods will have free entrance for that product in the market of the United States. But there is little prospect of working up a profitable business in the greatest steel producing country in the world. The Montreal *Star* says that the tendency will now be for Canadian steel makers to restrict their output to products which have the benefit of protective duties. Yet Canada's demand for wire is of great present magnitude, and is rapidly enlarging with the influx of new settlers into the prairie country. If that trade is left largely to United States makers of rods and finished products it will be worth their attention.

One Chance Yet

There is still a possibility that the bounties, at least on some articles, will be revived. In his budget speech Mr. Fielding made no reference to the reciprocity agreement, nor to the British preference, and volunteered no information as to renewal or nonrenewal of bounties. If Congress and Parliament approve the agreement it will come into effect, and then there will be a new situation calling possibly for new adjustments on the part of the Government. The Government has caused it to be understood that the establishing of the agreement would be followed by an increase in the preference to Britain. The Canadian market being thus further opened to competitors from the United States and Great Britain, the Government might be constrained to revert to the bounty method of assisting industry.

C. A. C. J.

Scientific Industrial Operation*

Some of the Changes It Has Wrought in Large Manufacturing Organizations

BY TRACY LYON, PITTSBURGH, PA.†

A great deal has been said recently, in the public prints and otherwise, of scientific management, and the railroad companies of this country have been particularly, and more or less unjustly, criticised for the lack of it. I believe that the public at large has rather a vague idea as to what this "scientific" management or operation consists of from a practical point of view, and while its principles have been very thoroughly defined by various eminent authorities, an effort to indicate very briefly some of the accomplishment in this direction may be of service to those who have not given the matter particular study.

There is a new schoolmaster abroad, or perhaps he might better be called a doctor, the "efficiency engineer," who stands ready to apply his medicine in the most scientific, though sometimes unpractical, manner. On the other hand, some successful manufacturers say that they do not want college men in their service, and disdain anything that smacks of being scientific; much as a "born" salesman might smile at the suggestion of the study of logic and psychology as an aid to salesmanship, even though he was unconsciously somewhat of an adept in their laws himself, and might profit greatly if he knew more about them.

What Scientific Management Means

It is hardly necessary to say that scientific management is not a new thing in itself, although its application in a thorough manner has been thus far limited to a comparatively small field. There seems to be little doubt, however, that it can be applied to advantage to any business, large or small, the only difference being that in the case of very large industries many years may be required to accomplish the task without an undue upsetting of conditions.

Scientific methods involve a casting aside of precedent and established usage, the determination by systematic observation and analysis of conditions as they are, not as they seem to be, and the application of the information so obtained to individual tasks.

It is natural to assume that when a man has worked at one task for years, whether on a machine tool or at manual labor under ordinary competent supervision, and with the advantage of his own experience and trade traditions, he would have reached a degree of skill and speed which could be increased by expert instruction in only a small degree. But this is not so, and therein lies the keynote of scientific management. It has been demonstrated that a man can be taught to double or even quadruple his output, with no greater or even less physical exertion, by means of a use of tools and a distribution of effort which he unaided would be incapable of evolving.

What the labor cost of an individual operation should be can only be determined by analytical time studies, in which personal equation and past performances are disregarded and every move is considered. The simple application of a graphic ammeter to a motor driven machine tool may tell a surprising story of repeated delay and undeveloped capacity. It may be said on behalf of employers that such studies are sometimes discouraged, to say the least, by the workmen themselves.

Knowledge of Work Standards and of Costs

In order to bring out the best and most intelligent effort on the part of most men it is necessary to establish and recognize a reasonable measure of their efficiency. And to develop this efficiency to its highest degree there must exist methods of compensation which will offer a comparatively large return for increased individual effort; an organization which will effectively plan in advance to bring together at the right time all information, tools and material required, and which will furnish adequate instruction and supervision and a carefully considered arrangement of appliances and machinery which will bring about an economical movement of the work. A very essential function of such an organization is to create a feeling of copartnership between employer and workman, and an understanding that the employer is not trying to get the most for the least wage but is willing to paly liberally for increased output and efficiency.

Many manufacturers do not know what the real and actual cost of their product is, particularly if it is diversified, because of a lack of adequate cost accounting and because the overhead or general charges are not properly distributed, to their own detriment as well as to that of the public. This is not an easy question to solve, but there are scientific methods of accomplishing it. I believe that railroads would purchase many articles they now manufacture if they had a truer knowledge of their shop costs. Railroad shops have no balance sheets to face and do not necessarily go out of business if they are not making money.

On one railroad, with whose operations I was familiar some years ago, allowances were established for the cost of repairs to equipment per ton mile, or mile run; for the cost of coal used by locomotives per ton mile, for roundhouse expenses per locomotive handled, for terminal expenses per car switched, for freight house expenses per ton of freight handled, as well as many other expenses. These allowances were based upon a more or less scientific study of what the cost should be, and each foreman and station master knew every day whether he was ahead or behind the game. In the same way, allowances for expenses of all kinds may be established in any business, using as a basis percentages of direct or productive labor, of cost of product, of sales, a certain amount per unit produced or order handled, or whatever other basis may be devised to appeal to the man who is directly responsible for the expense, and thus place before him a constant record of the amount by which the allowances are exceeded.

Such records and comparisons may perhaps be shown most clearly if plotted as curves. In fact, I do not believe that the financial and operating details of any large and complex business can be properly appreciated and studied without the use of graphical records. By these means a field can be covered and comparisons made which would be impossible with the use of figures alone.

Department Organization Extended

Rather an interesting development has taken place in the last few years in the organization of several of the largest manufacturing plants in this country. These plants have a highly diversified product and were originally laid out to centralize the manufacture of many parts in highly specialized "feeder" sections, such parts being delivered as required to the various assembling departments. As these plans grew in size it became increasingly difficult to bring about a uniformly prompt delivery of parts by the feeder sections, and it was finally determined that the most economical results could be obtained by breaking up the greater number of these sections and distributing their tools among the assembling departments, even though this entailed some duplication of equipment and an abandonment of the benefit of centralized specialization. This step toward the departmentalization of very large shops has brought out the advantages to be obtained in broadening the responsibility of the heads of departments and in holding them accountable for results. A further step has been to give finished materials, and the regulation of these stocks in a system of interdepartmental accounts, making each department pay for all labor, power, heat, light, supplies and materials it receives, and to give it its own engineering staff. This industrial development is parallel to the division organization of some railroads and to the organization of the great department stores.

* Read before the Congress of Technology, Boston, Mass., April 11, at the 50th anniversary of the Massachusetts Institute of Technology.

† Assistant to first vice-president of the Westinghouse Electric & Mfg. Company, Pittsburgh, Pa.

Other Features of Scientific Methods

Scentific methods involve the use of the most expert advice obtainable, as to the selection and handling of material, the choice and maintenance of tools, the processes of manufacture and operation and the elimination of wastes. The possibilities of industrial chemistry are unlimited. I believe that many manufacturers fail to expend as much as they should for such services or for an efficient staff, for lack of appreciation of the very large returns which may be obtained thereby at an expense which is very small compared with the amounts involved.

The success of a manufacturing business may depend upon the amount of money tied up in stocks of raw and finished materials, and the regulation of these stocks in a more or less automatic manner is one of the large problems which requires scientific treatment.

Scientific management would not permit factories to be poorly lighted, as many are. It can be demonstrated that the cost of furnishing the very best light obtainable is inconsiderable in comparison with the benefits to be derived in an improvement in the quality of work and increased production. The same thing may be said of the cost of improving sanitary and other conditions which affect the comfort and health of the workman, and of maintaining orderliness and cleanliness.

The Drucklieb Multiple Injector Sand Blast

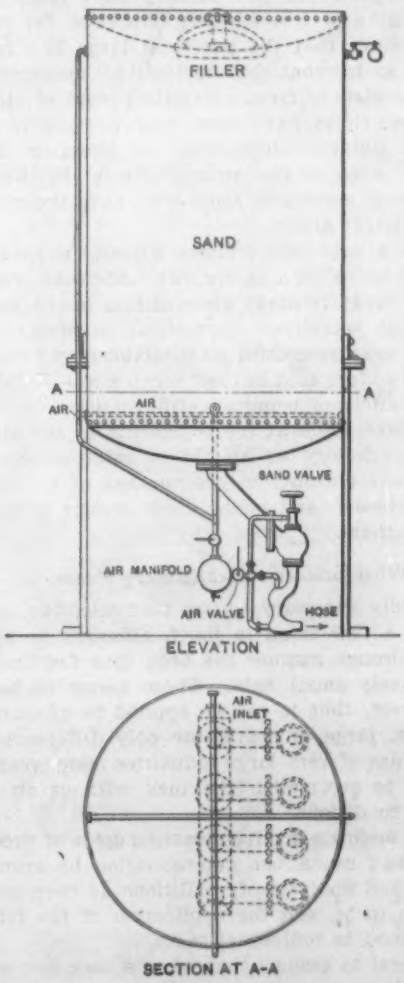
A sand blast having greater capacity than that ordinarily employed and capable of being subdivided is frequently needed in large foundries. To meet this requirement J. M. Betton, 178 Washington street, New York City, has placed on the market the Drucklieb multiple injector sand blast, which is designed more especially for use in foundries having a large output of pieces of a similar character.

A vertical cylindrical tank made of riveted boiler steel and capable of withstanding a working pressure of 80 lb. per square inch is employed for storing the sand. Both the ends of the tanks are dished and in the upper one there is a large sand inlet closed by a manhole cover. One, two, three or four outlets, with pipes to lead the sand to a special form of the Drucklieb injector sand blast apparatus, which was illustrated in *The Iron Age* January 5, 1911, are attached to the bottom of the tank by flanged connections. The sand is thoroughly mixed with the air in the sand blast apparatus and discharged at the maximum velocity through a line of rubber hose equipped with a nozzle holder. The flow of sand is regulated by a sand valve, which is of such a design that it will not jam under the pressure of the sand. One of its special features is a central air jet that imparts a greater evenness and regularity to the flow of the sand than is obtained by gravity alone, the current of air forming a low vacuum underneath the valve and effecting this.

The supply of compressed air is piped from the air receiver near the compressor through a riveted steel manifold, which is placed horizontally under the sand tank, and also serves as an air separator. The supply for each outlet is controlled by a single lever-handle, quick-opening gate valve, the air being piped to the sand valve and the mixing and the forcing openings. The flow of sand through each outlet can thus be started, regulated and stopped independently of the others without affecting their action in any way. The necessary draining facilities are also provided for the manifold.

Air is piped from a separate connection controlled by one valve to the upper part of the tank to balance the pressure, and also to two perforated tubes placed at right angles near the bottom of the sand tank. Small jets of air delivered through these openings agitate the sand and further facilitate its flow. The mixed air and sand currents are delivered through a length of rubber hose from each main outlet to the nozzle holder in the customary way. Where required further subdivisions can be made by employing Y-fittings.

When this system is used the Drucklieb sand blast apparatus can be attached to the bottom or the sides of any closed tank from which sand will flow, the number being determined by the requirements of each particular case, since the individual outlets operate independently of all the others. In use, the sand is elevated to one central point, and the delivery hose led to separate cleaning rooms. If it is desired to carry on the sand blasting work continuously, this can be done by superposing a second tank with the necessary valves and piping upon the regular sand tank. These multiple sand blasts are made with capacities of 2000, 4000, 6000 and



Elevation and Section of the Drucklieb Multiple Injector Sand Blast Made by J. M. Betton, New York City.

16,000 lb. of sand and with one, two, three or four outlets. These outlets are generally located in the line so as to face in the one direction, but they can be turned to face any point of the compass if desired. While 80 lb. is the maximum pressure under which these sand blasts can be worked, they nevertheless will operate at lower pressures without making any changes or adjustments, and the lower air pressure is more generally used, as it produces a more economical consumption of power.

The American Association of Refrigeration, of which J. F. Nickerson, Chicago, is secretary, will hold its second annual meeting in the East Room of the La Salle Hotel, Chicago, May 9 and 10, the first session opening at 10.30 A.M. Reports will be received from the official delegates to the second International Congress of Refrigeration held in 1910 in Vienna, Austria, and from the committee appointed to investigate the claims and proposals of the several cities desirous of securing the third International Congress which is to convene in the United States in 1913.

The Alberta Rolling Mills Company, Ltd., is building a rolling mill at Medicine Hat, Alberta, Canada, and expects to have it ready for operation by May 1. Iron bars and bands will be rolled. Natural gas will be used. J. L. Pollock is president; S. C. Dunn, vice-president; A. L. Scott, treasurer; W. F. Goodison, secretary; and F. Zeigahn, manager.

A New Pennsylvania Railroad Track Scale

A Mechanical Hump and a Relieving Gear Are Two of Its Special Features

In the 52-ft. track scale recently installed at the West Brownsville Junction, Pa., of the Pennsylvania Railroad, radical departures have been made, most of which are covered by patents secured by A. W. Epright, the company's scale inspector. One of the most important features of the new scale is a mechanical or adjustable hump to regulate the speed of gravity switching of cars over the scale, and the grade on the hump can be varied from a minimum of 1 per cent. to a maximum of 4 per cent. by adjusting devices. Probably the most ingenious feature of the new scale is the relieving gear, which is an arrangement of power operated jacks permitting the mechanism of the scale to be disconnected entirely from the track. Operating this gear enables the heaviest engine to pass over the scale without registering a pound of weight, while the disconnection is made without affecting the balance of the scale in the least. As the surface platform is supported entirely independently of the scale mechanism, wind pressure or snow and ice on the platform do not destroy the accuracy of the scale's balance. Fig. 1 is a plan view and sectional elevation of the scale, together with a diagram of the loads on the various levers. Fig. 2 illustrates the method of connecting the scale beams in the pit, while a view of the

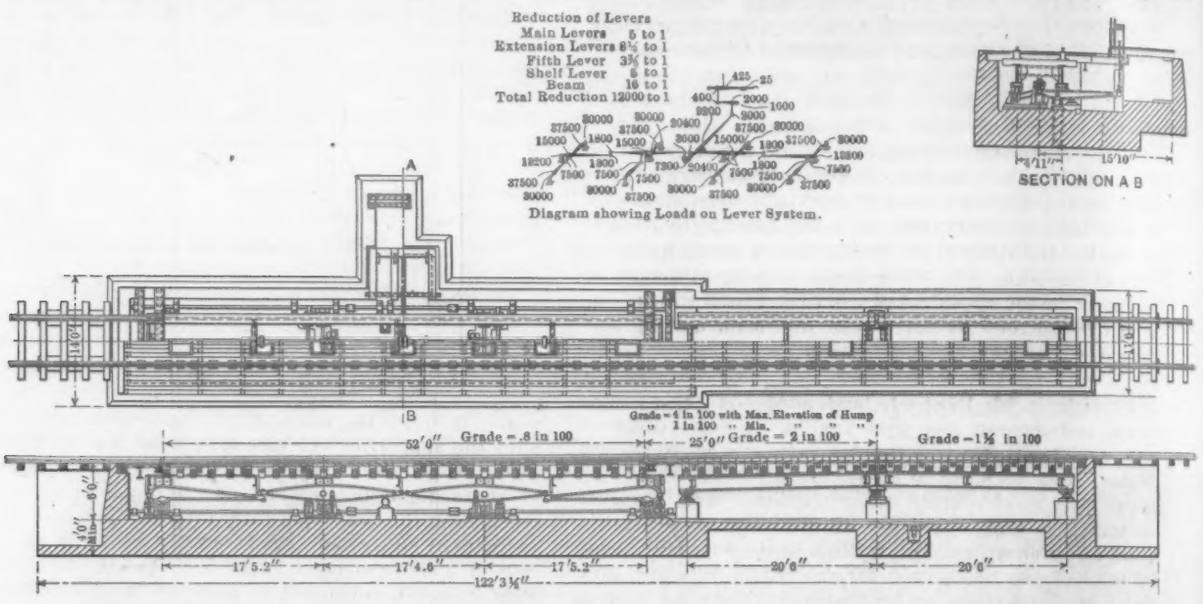

Reduction of Levers
Main Levers 5 to 1
Extension Levers 6½ to 1
Fifth Lever 3⅜ to 1
Shelf Lever 6 to 1
Beam 16 to 1
Total Reduction 12000 to 1
Diagram showing Loads on Lever System.
SECTION ON A B
Grade = 4 in 100 with Max. Elevation of Hump
" 1 in 100 " Min. " " "
52'0" Grade = .8 in 100
25'0" Grade = 2 in 100
Grade = 1¼ in 100
17'5.2"
17'4.6"
17'5.2"
20'0"
20'0"
122'3¼"

Fig. 1.—Details of the New 52-Ft. Track Scale Installed by the Pennsylvania Railroad at West Brownsville Junction, Pa.

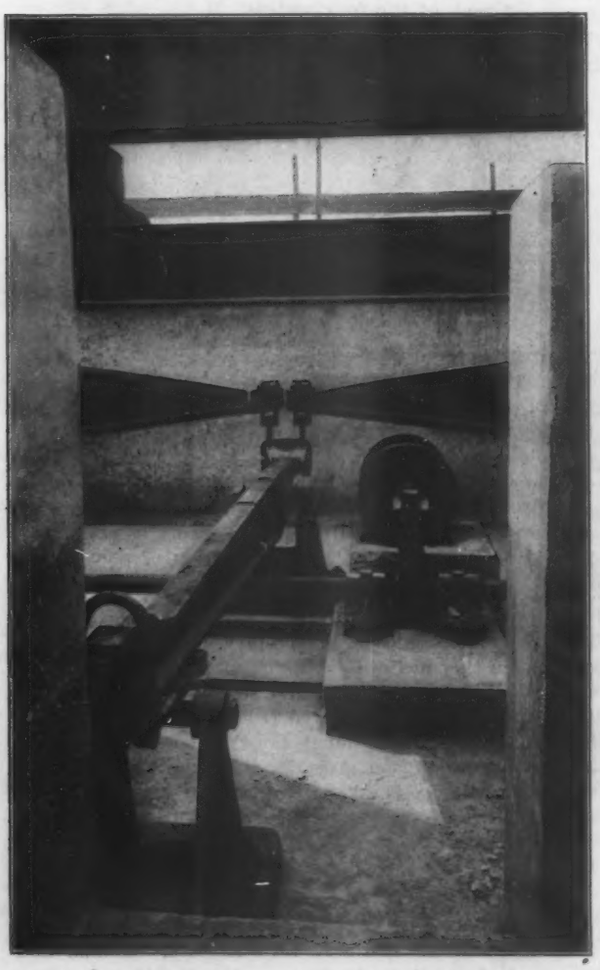


Fig. 2.—Method of Connecting the Scale Beams in the Pit

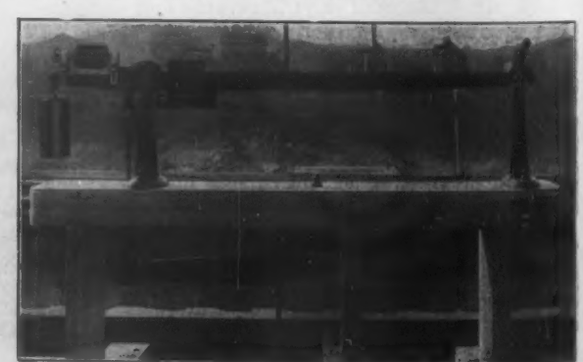


Fig. 3.—The Scale Beam Used.

type of beam employed for registering the weight is given in Fig. 3. Fig. 4 shows the end levers, the torsion shaft and the end toggle jacks of the relieving gear, while Figs. 5 and 6 are sectional views, the former being a longitudinal section at the end, and the latter a half-cross section with the floor removed. Fig. 7 illustrates the system of levers used in connection with the relieving gear. Fig. 8 gives a view of the track scale and the hump showing some of the details of the scale platform construction, while Fig. 9 shows the mechanism for adjusting the apex of the hump and Fig. 10 the beams of the scale platform.

Constructional Details

It will be noticed by referring to the longitudinal section through the scale and the hump shown in Fig. 1 that all wooden substructure has been eliminated, and

Fig. 4.—The End Levers, the Torsion Shaft and the End Toggle Jacks of the Relieving Gear.

that the main bearings are of the suspension type, thus providing greater freedom of action of the platform as they get rid of the gyration of the knife edges across the face of the hardened steels, as well as giving greater arcs of motion from the point of platform suspension to the base of the scale rail. An analysis of this bearing which is shown in the upper portion of Fig. 1 and also in Fig. 2 will reveal the fact that the main lever is rigidly supported from the bedplate castings, and that a saddle block with an inserted compensating steel engages the knife edge. Two links are suspended from this saddle block and support the yoke casting at eight different points. These yoke castings in turn are bolted to eye beams, thus forming a metal bridge from which the scale rails receive their direct support. This form of construction enables an oscillating motion in a longitudinal direction with sliding friction at the supporting ends of the links to be secured for the platform, while in a transverse direction an undisturbed pendulous motion is obtained. All of the main lever stands and the extension lever stand, supported from the four main bed plates, have self-compensating steels wherever a pivot contact is made and the independent alignment of each individual lever by adjustments at their connections.

The scale has a full capacity beam reading to 300,000 lb., which is shown in Fig. 3. This beam is equipped with a poise operating on a set of a specially designed ball bearings. This reduces the resistance from about 4 lb. to as many ounces. To insure the latch seating perfectly in the teeth of the beam at all times a mechanical spring with means for adjustment has been provided to operate it.

The Relieving Gear

The most radical departure from the older form of construction is probably the introduction of the relieving

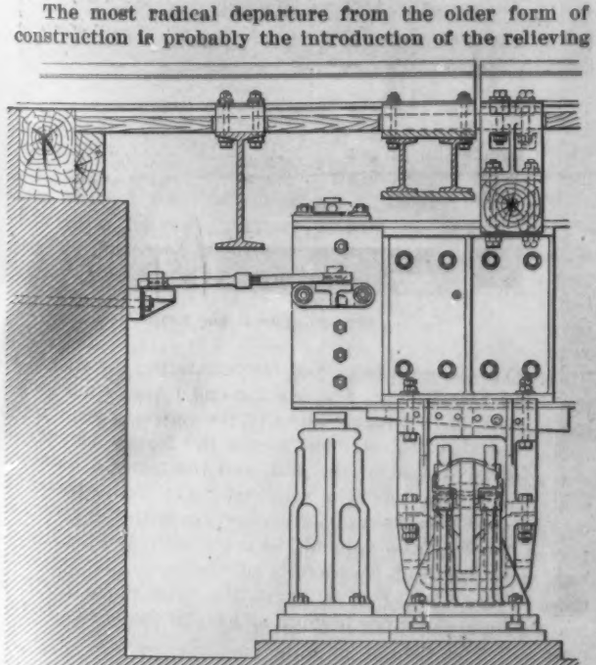


Fig. 5.—Longitudinal Section at End.

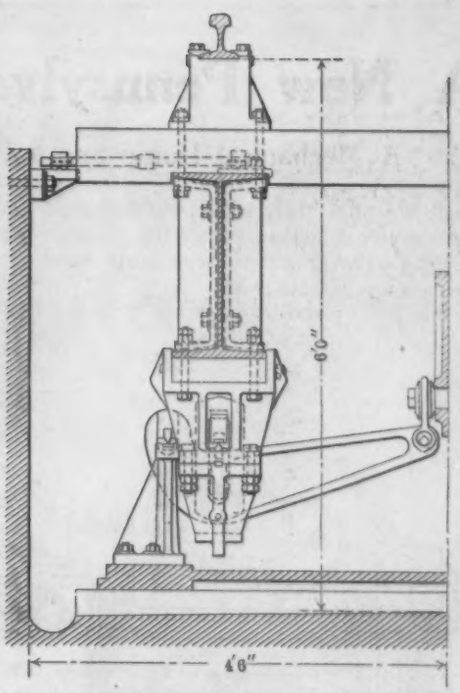


Fig. 6.—Half Cross Section with Floor Removed.

gear. It takes the place of the rigid dead rail system, with the supporting columns that filled the vault practically full of metal, thus preventing the proper inspection of the scale bearings, and also eliminates the second track over the scale, together with the approaches and switches at either end. Primarily this relieving gear consists of a series of eight toggle lever jacks, illustrated in Figs. 4 and 7, supported in pairs by the universal bedplates. The torsion shaft, with suitable link connections at each of the four sections of the scale, operates these jacks. This torsion shaft, which is shown at the right

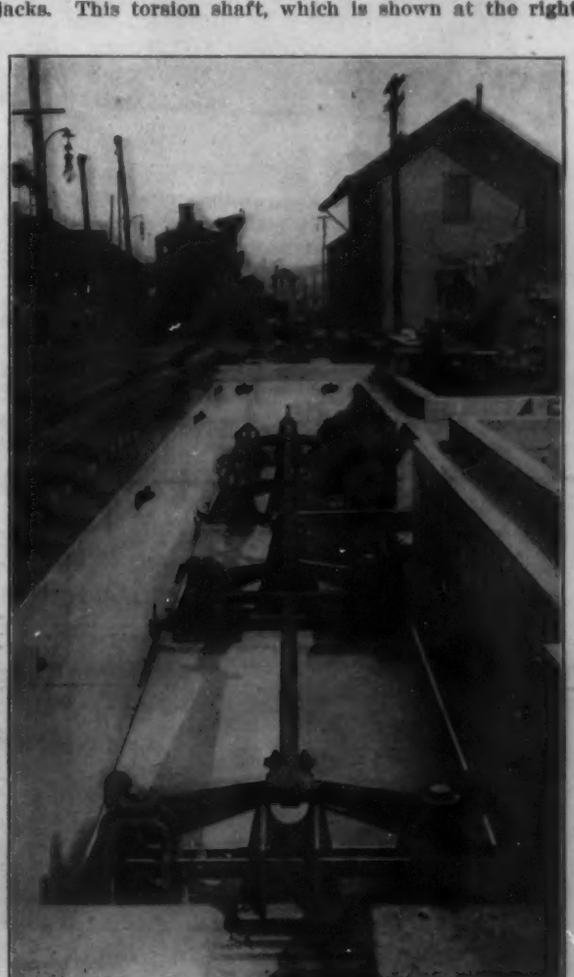


Fig. 7.—The Lever System and the Relieving Gear.

Fig. 8.—View of Track Scale and Hump, Showing Details of Scale Platform Construction.

of Fig. 4, in turn is operated by a double-ended cylinder shown at the right of Fig. 2 and just beyond the opening in the right scale pit wall, Fig. 7. This cylinder is controlled by the weighmaster in the scale office, and the power employed is either compressed air or water, the former being preferred. A hand operated mechanism that can be quickly connected in case the power gives out is also provided.

The scale track is converted into a dead track by the weighmaster operating a four-way control valve, which causes the toggle jacks to be put in operation, so that the plungers travel upward against the I-beams, supporting the metal bridge and raise the platform from its ordinary position on the suspension links by relieving the knife edges of all weight without causing the knife edge contact on the bearing steels to be disturbed. The throwing in and the releasing of the relieving gear is accomplished without changing the original alignment of any part of the scale system, and as the knife edges do not leave their seats when the platform is raised, the balance of the scale is practically maintained when the bridge is again lowered.

The total weight of the platform is about 38,000 lb., and with an approximate pressure of 80 lb. per square inch in the cylinder the bridge can be raised so that the heaviest engine will not show any weight on the beam when going over the scale. The operating gears cannot, of course, be worked under a superimposed load, but as the average interval between the cuts of the cars is 18.6 sec., and the relieving gear can be operated in about 1 sec., this is not necessary.

The Mechanical Hump

The object of the mechanical hump is to provide a simple and effective means whereby with a minimum amount of attendance for manipulating the cars, the latter can be passed rapidly and without stopping over the platform of the scale with the proper velocity to permit each to be weighed as it passes over the platform regardless of variations within the usual limits in the lengths of successive cars. This is accomplished by providing the track over which the cars pass to the scale with a hump having a fixed apex at a short distance from the adjacent end of the scale platform. The proportion between the slope at the side adjacent to the scale to the distance between the apex and the scale platform and the rate at which the cars are to be weighed is such that when the cars are pushed at a uniform rate up the side of the hump away from the scale and are uncoupled, either before or while being pushed up the hump, each will run down the opposite side and on the scale platform with the proper velocity to secure accurate weighing. A view of the scale and the hump is given in Fig. 8. All the cars passing over the railway scale at the head of a classification yard are not of one pattern, and the distances between the front and the rear wheels vary. These variations in wheel base length are in a measure automatically compensated for by the mechanical hump, which is so designed that the elevation of its apex above the scale platform can be adjusted to get the desired relations which insure the proper velocity of the cars when passing over the scale platform.

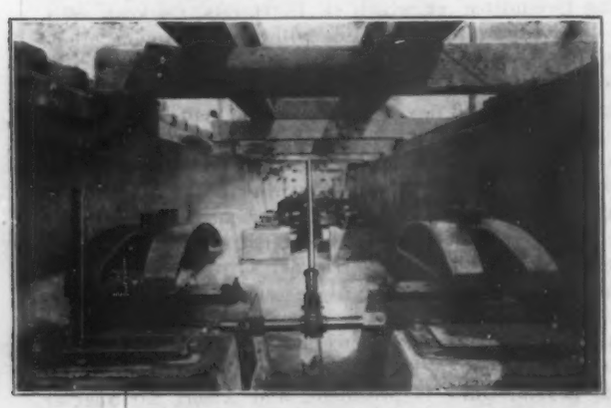


Fig. 9.—Mechanism for Adjusting the Hump Apex.

Fig. 10.—The Scale Platform Beams.

The construction of the hump provides for two sets of box chords or girders running parallel with and directly under each rail in the track overhead. These two sets of chords are supported at the center, which forms the apex of the hump, by rigid steel castings located parallel with the track. These in turn are supported by abutments on either side to which bedplates are bolted. These abutments also support two toggle lever jacks of the Sansom screw type directly under a vertical line passing through the center of the rails. These jacks are connected universally by an extension socket and are operated by a hand ratchet with a lever arm at the center, as shown at Fig. 9. At the four ends of the box chords pivotal castings are bolted which also are supported by the bedplates on the abutments. Surfaced hardwood ties are bolted to the box chord system, and to these in turn are bolted square cast iron columns projecting through the platform covering the top of the inclosure. The details of this construction are clearly shown in Fig. 8, and the rails forming the track over the hump are bolted to these columns with railslips.

The present design of hump provides for a vertical rise of 8 in. at the apex which is located about 25 ft. from the scale.

When the apex is raised to the proper hight, distance pieces or liners are inserted under the center casting, after which the jacks are released. This arrangement rigidly supports the center casting at the apex at all times, as the jacks do not carry the superimposed load, but are merely employed to raise and to lower the apex. The changes in the length of rail, due to raising or lowering the apex and expansion and contraction caused by atmospheric changes, are compensated for by placing a bronze friction plate at the base of the four pivoted castings on either end. This permits a free change in a longitudinal direction of the four pivotal castings bolted to the box chord to be secured.

The Gardner Crusher

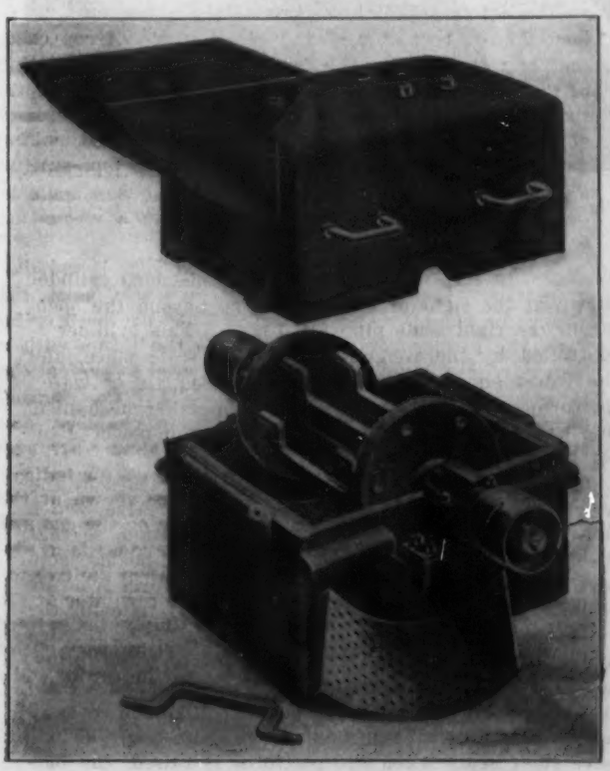
For grinding any material, either wet and dry, to any degree of fineness from 1 in. to 100 mesh, the Gardner Crusher Company, 556 West Thirty-fourth street, New York City, has placed on the market a combined crusher, disintegrator and pulverizer. The special features claimed for this machine are the small driving power required in proportion to the output, and a special type of crank construction by which, if the material being crushed offers too much resistance, the beaters will turn on their axles, thus avoiding breakage. In many cases it is claimed that for certain materials the crusher is superior to one of the jaw type. When used in this way the Gardner crusher is operated as a single-stage reduction machine, and the material is fed directly from the quarry and reduced to the desired fineness in one operation without the use of any auxiliary equipment. This, however, is not recommended by the maker, as for very fine and regular grinding this crusher should be merely used in preliminary work before the material goes to the tube mill.

The machine consists of a very strong iron frame, cast in two parts, the lower one being the base and the upper one containing the hopper. The contact surfaces of both parts are planed to secure a perfect fit, while to prevent dust from entering, the top is fastened in place by bolts. In this way it is possible to inspect and clean the apparatus quickly by merely stopping it, removing the belt and lifting the top. The main shaft, which is located in the lower part of the frame, rests in two large bearings, that are provided with self-oiling lubricators. Mounted on this main shaft are two cheek plates, connected by articulated beaters, in the shape of brace cranks, which are clearly shown in the lower part of the engraving. These beaters are made of high grade manganese steel and are the only part of the apparatus subjected to wear. Their life depends upon the hardness of the material which they are employed to crush, and varies from one month to a year. The bottom of the crusher is a rounded, perforated iron plate, which acts as a screen for the material being discharged. Movable ribs of very hard metal are mounted on the inside of the top and can be moved down close to the cranks in case of wear, and also regulate the degree of fineness of the product. The material is fed into the crusher through the hopper placed at the left end, either by shovels or an automatic feeder, the latter not only improving the output of the mill, both as regards quality and fineness, but also lessening the amount of power required.

In operation the material passes through the hopper into the crusher, and one after another of the six cranks forming the crushing mechanism strike it rapidly in succession and break it into particles according to the degree of fineness required. The discharge is effected with great rapidity and the material is swept on the surface of the perforated grates in the lower portion, the combined action of the rotation thus imparted to it and the centrifugal force driving it out of the apparatus as quickly as the degree of fineness will permit.

The crusher can be mounted either on a bed of solid masonry or in a pit. In the latter case the bearing blocks for the main shaft rest on the side walls of the pit, which have the necessary strength to support them. When the product of the crusher falls into the pit, it can be removed either by a bucket conveyor, the lower end of which is placed under the discharge grate, or else by an endless belt running under the machine and receiving the crushed product directly. This latter method is recommended when several crushers are in operation.

Three sizes of crusher are made for handling material, the maximum dimensions of which are for the No. 1 machine 10 x 5 in., for the No. 2 machine 13 x 9 in. and for the No. 3 machine 14 x 12 in. A test made with very hard cement clinker in the No. 1 machine equipped with a screen having ⅛-in. holes gave an output of 6000 lb. per hour, 98 per cent. of which would pass through a 16-mesh sieve and 40 per cent. through a 100-mesh sieve. The same machine when equipped with a 1-16-in. screen and producing 4000 lb. per hour gave an output, 100 per cent. of which passed through a 16-mesh sieve and 70 per cent. through a 100-mesh sieve. Changes in the size of the output can be easily secured by changing the screen, whose only office is to regulate the fineness of the discharged material, and changing the speed.



The Crusher, Disintegrator and Pulverizer Built by the Gardner Crusher Company, New York City.

Gas and Gasoline Engine Trades Convention

The National Gas and Gasoline Engine Trades Association, which will hold its next convention June 20 to 23, inclusive, at the Hotel Pontchartrain, Detroit, Mich., has issued its preliminary programme. The first day's session arranges for the report of the Marine Engine Committee, of which G. D. Harris, Oshkosh, Wis., is chairman. This committee will provide, among others, for a paper on "The Relation of Ignition to the Sales Department," by R. H. Combs, St. Louis. On the morning of the second day a report will be made by the Agricultural Power Committee, of which Prof. P. S. Rose is chairman. The morning of the third day will be given up to miscellaneous business, while in the afternoon a paper will be presented by E. St. Elmo Lewis on "Advertising and Business Management." Excursions for entertainment have been arranged as well as visits to a number of the leading local factories. The convention exhibits will be arranged in rooms adjoining the meeting hall, with no charge for space, but reservations should be made in advance to insure accommodations. C. O. Hamilton, Elyria, Ohio, is president, and Albert Stritmatter, Cincinnati, Ohio, is secretary.

The Doherty Gas Calorimeter

A New Instrument for Determining the Heating Value of Combustible Gases

The Improved Equipment Company, 60 Wall street, New York City, is manufacturing a new type of gas calorimeter under patents granted to Henry L. Doherty. The special advantage of this calorimeter is that the calorific value of any combustible gas can be measured without requiring much time in making the test and little or no calculation on the part of the operator. The fundamental principle of the Doherty calorimeter is the direct displacement of the gas being tested by the water which is heated by the gas during the test, thus maintaining the ratio between the volumes of gas and water absolutely constant. The water displacing the gas imparts pressure to the latter which is secured from a constant static head in the regulator of the calorimeter. Every cubic inch of water passing the flame is heated by the burning of the same quantity of gas displaced by it and determining the heating value of the gas in B. t. u. becomes simply a question of measuring temperatures and making necessary corrections for the conditions of temperature and pressure existing at the time the test was made in order that the results may be reduced to a recognized standard.

The calorimeter which is shown in Fig. 1 and diagramatically in Fig. 2 consists of two essential parts, the absorption chamber and the tank. They are both cylinders, the former being placed inside the latter with a heavy layer of non-conducting felt between to prevent the interchange of heat through the walls. The Bunsen burner is located within the absorption chamber, and thus a compact, self-contained and very simple arrangement is secured. The tank has a gauge glass for indicating the water lever inside and a U-gauge shown at the right of Fig. 1 for indicating the pressure on the gas and the water in inches of water. The gauge glass is graduated in nine equal parts, the volume between the two extremes being exactly 1-3 of a cu. ft. The regulator at the rear of the central portion of Fig. 1 is simply a standpipe in which constant pressure is maintained by a supply of flowing water, part of which escapes to the drain, while

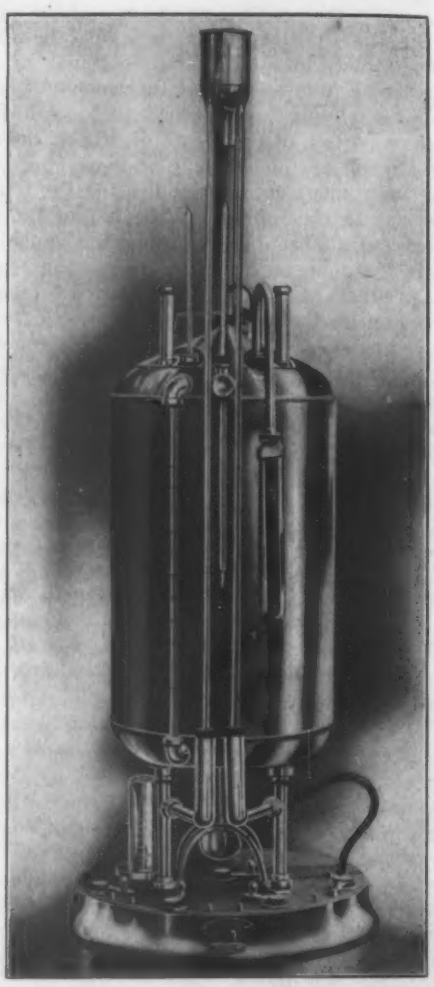


Fig. 1.—The Doherty Gas Calorimeter Made by the Improved Equipment Company, New York City.

plates within the absorption chamber control the temperature of the flue gases passing out from the calorimeter so that their temperature can be made the same as that of the room. This is done so that no heat is given

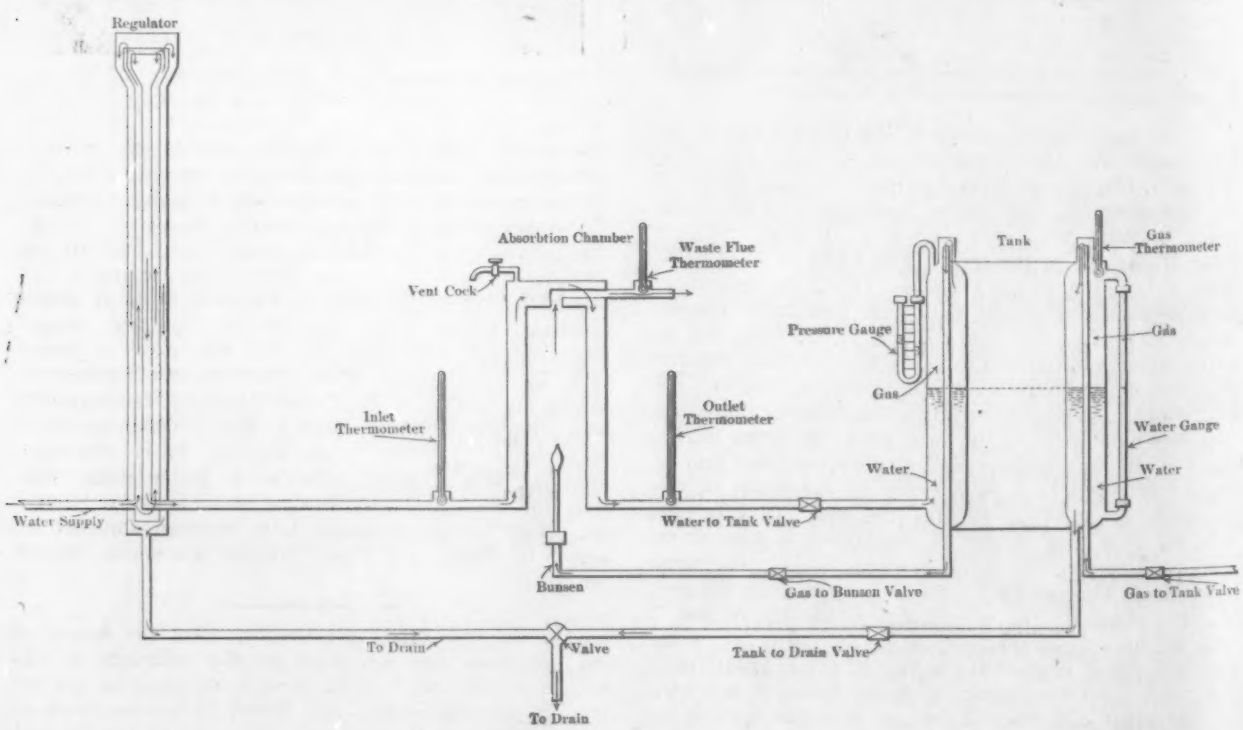


Fig. 2.—A Diagrammatic View of the Calorimeter.

the remainder keeps the standpipe full as displacement occurs in the tank.

The water passes from the standpipe through the absorption chamber and into the tank, its course being clearly indicated by arrows in Fig. 2. Adjustable baffle to or taken from the air, and the only heat absorbed by the water in the combustion chamber is produced by the combustion of the gas. Five thermometers are used in connection with the calorimeter. These measure the following temperatures: that of the water entering the ab-

sorption chamber, that of the water leaving the absorption chamber, that of the gas in the tank, that of the products of combustion and the atmospheric or room temperature. The inlet and outlet thermometers are the two long ones extending from the base of the calorimeter to the enlarged portion of the regulator, Fig. 1, the outlet thermometer being on the left side and the inlet on the right. The instrument used for indicating the temperature of the gas in the tank is at the left of the outlet thermometer and almost directly above the gauge glass. The flue gas thermometer which measures the temperature of the products of combustion is located between the inlet and the outlet thermometers and projects from the top of the calorimeter. Directly beneath this thermometer in Fig. 1 can be seen the instrument indicating the room temperature.

With this calorimeter the sample of gas to be tested is drawn into the tank very slowly by opening the valve marked "gas to tank," Fig. 2, and opening slightly the one marked "tank to drain." The gas supply is then shut off and water is admitted from the standpipe by opening the "water to tank" valve, thus imparting the pressure of the regulator to the gas. This pressure is adjusted to 2.6 in., which is the standard for conducting tests by the adjusting valve on the U-gauge. At this point the temperatures on all the thermometers are noted and recorded. The Bunsen burner is lighted and the displacement of the gas immediately begins to take place. The area of the baffle plates in the absorption chamber exposed to the gas is adjusted until the gases of combustion emerge into the atmosphere at room temperature. The water level in the gauge glass in the meantime will have risen almost to the first graduation, and when this point is reached all temperatures are noted, and this is repeated as each mark is reached, thus giving 10 readings at equal intervals. The average of these 10 readings is taken as the basis of computation in a test.

In determining the calorific power of the gas these two formulæ are employed:

$$V = \frac{17.64\,[(h + h') - a]}{460 + t}$$

$$\text{B.t.u.} = \frac{62.5\,d}{V}$$

V = the volume of gas corrected to 60 degrees F. and a pressure of 30 in. of mercury.
h = the barometric pressure in inches of mercury.
h' = the U-gauge pressure in inches of mercury.
a = the vapor tension pressure in inches of mercury.
t = the temperature of the gas in the tank.
d = the difference in temperature between the water before and after passing through the absorption chamber.

All of these values except h and a are given by the calorimeter, and the former can be secured at the time the test is being made from a barometer, while the latter can be determined from tables furnished with the calorimeter, showing the vapor tension at different temperatures of the gas in the tank. The value of h' is 0.0769 times the reading of the U-gauge. It will be seen, therefore, that making a test with this instrument consists simply in reading the temperatures of the inlet and the outlet water, multiplying the difference between them by 62.5, and multiplying this result in turn by the value of 1/V, which is secured from tables furnished by the maker. The result obtained in this way gives the gross heating effect of the gas under test, but does not take into account the latent heat represented by the water of condensation produced in burning the gas. To determine this the following method is employed: A drip at the lower end of the absorption chamber collects the water of condensation and discharges it into the glass graduate shown underneath the calorimeter at the left of Fig. 1. This graduate is marked both in c. cm. and B.t.u. When the water level reaches the lowest of the graduations of the gauge glass the amount of condensation in the graduate is noted, and when the water level has reached the top mark on the gauge glass, the increased amount of water in graduate is recorded. This shows the amount of heat represented by the water of condensation, and when multiplied by three, as 1/3 cu. ft. of gas was burned, the B.t.u. value of water of condensation per cubic foot of gas tested is secured. This when subtracted from the gross result secured by the temperature readings gives the net calorific value per cubic foot of the gas under test.

Provision is made in the construction of the calorimeter whereby the pressure in the tank cannot be increased beyond that equal to a few inches of water, while at the same time the water continues to flow through the absorption chamber and out through the drain, thus preventing any overheating of water, which might result in an explosion if the burner were left lighted and the flow of water through the absorption chamber obstructed. In addition the instrument can be completely drained and all the air expelled from the tank and the piping at the conclusion of a test.

A New Vessel for the Cuban Coal Trade

The Havana Coal Company (Berwind-White Coal Mining Company), Philadelphia, held open for inspection at Pier 28, South Wharves, Philadelphia, on April 8, the new steamship Berwindvale, which it will operate in the coal trade between Havana and Atlantic Coast ports. The vessel is a sister ship to the Berwindmoor, operated by the same company. Both were built by Sir Raylton Dixon & Co., Ltd., Middlesbrough, England, and are specially designed as coal carriers. They are of the single deck type, constructed on the Harrow-Dixon patent cantilever frame system, with cellular double bottom and side tanks for water ballast. The five holds are entirely free from obstructions and the hatchways are unusually large. The length over all is 425 ft., breadth 54 ft., molded depth 29 ft. The engines are of the triple expansion type, with cylinders 28, 46 and 77 in. in diameter, and a stroke of 48 in., developing about 4000 hp., and giving a speed of approximately 14½ knots per hour. Three single ended boilers 15 ft. 3 in. by 11 ft. 6 in., each with three Morison suspended furnaces 45½ in. diameter, furnish the steam. One peculiarity of these steamships is the absence of masts. Eight derrick posts, ranged in pairs convenient to the hatchways, serve for loading and discharging purposes. Light spars for signal purposes and for carrying wireless aerials are supported from cross beams connecting each pair of derrick posts. The Berwindvale arrived at Philadelphia recently on her maiden voyage, carrying a cargo of 7540 tons of Swedish iron ore from Narvik, making the voyage of 3650 miles in 18 days.

Detroit-Fenestra Steel Sash Orders.—The Detroit Steel Products Company, Detroit, Mich., reports a good volume of orders for Detroit-Fenestra steel window sash. Among the larger orders received recently are for steel sash for new factory buildings to be erected by the following companies: Milwaukee Steel Foundry Company, Milwaukee, Wis.; National Supply Company, Toledo, Ohio, one-story, saw-tooth roof, large factory building and machine shop; Northwestern Terra Cotta Company, Chicago, Ill., five-story building; Favorite Stove & Range Company, Piqua, Ohio, large foundry building; Mengel Box Company, Louisville, Ky., for new plant at Jersey City, N. J.; Carnegie Steel Company, for building at Youngstown, Ohio; C. W. Parker Company, Leavenworth, Kan.; Kieffer Building, Detroit, Mich.; Oklahoma Railway Company, power house and car barns; Standard Sanitary Mfg. Company, Dawes & Myler plant, New Brighton, Pa.; American Rolling Mill Company, Middleton, Ohio, new power house, A. B. Neuman, Chicago, engineer in charge, and Bush terminal warehouse, Brooklyn, N. Y.

For the first time since October, 1910, the figures of car surpluses and shortages on the railroads of the United States and Canada show a decrease in the net total of idle equipment. On March 29 the surpluses of idle freight cars of all classes amounted to 196,217 cars and the reported shortages 1,330 cars, leaving a net surplus of 194,887 cars, compared with 207,261 cars on March 15. This represents a decrease of 12,374 in idle cars, whereas, in the month ended March 15 there was an increase of 33,600 cars.

Employers' Responsibilities

Under the chairmanship of W. L. Saunders, president of the Ingersoll-Rand Company, the New York State Employers' Welfare Section of the National Civic Federation held a meeting at the rooms of the New York Board of Trade and Transportation, 203 Broadway, April 6. The programme was in charge of the Committee on Improvement of State Inspection of Factories of the Department on Compensation for Industrial Accidents and Their Prevention. The immediate purpose of the meeting was to discuss the recent deplorable fire which had brought suffering and death to many employees in the Triangle shirt waist factory in New York City. The circumstances attending this fire have brought out the necessity of paying still greater attention to welfare work, including sanitary work rooms, fire escapes, fire drills and industrial insurance. In opening the meeting Mr. Saunders said: "We employers ought to care for the health, comfort and safety of our workers. Each employer should be held responsible for his workers' life and welfare, civilly and criminally, when negligence or carelessness is proved against him."

Among those contributing to the discussion were Fire Chief Croker, of New York City; State Labor Commissioner Williams; Henry R. Towne, president of the Merchants' Association and also of the Yale & Towne Mfg. Company, and Louis B. Schram, chairman of the United States Brewers' Association. Earnest appeals were made for the more efficient inspection of factories. The statement was made that while the New York State Department of Game has 75 inspectors, the State Department of Labor is provided with only 50. There are 60,000 factories in the State of New York, and consequently the inspectors of the Labor Department can only visit them once or twice a year. Insufficient power is also a weakness of this administration of State supervision. The department is powerless, for example, to make a manufacturer rearrange the machinery in his factory so as to give greater space to pass between the machines. Chief Croker pointed out the fact that the responsibility for fire protection facilities in factories in New York is divided among the Health Department, the Building Department, the Tenement House Department, the Fire Department, and the Water, Gas and Electricity Department. He claimed that the responsibility should be placed in one department, which should not only inspect every factory building in the city at stated intervals, but that owners should be given only two weeks after its inspection for compliance with notices made of failure to carry out regulations, after which, if the warning is unheeded, the department should close the factory.

The Southwark Reversing Convertible Simple or Compound Engine

The First of This Type Built in America Recently Installed at the Cambria Steel Company

One of the special features in the equipment of the steel plant of the Grand Crossing Tack Company, Chicago, Ill., described in *The Iron Age*, August 4, 1904, was a reversing engine which was the first of its kind in America. It was built in Germany and had three 40 x 40 in. steam cylinders and operated at a maximum speed of 200 rev. per min. Recently a similar engine has been built by the Southwark Foundry & Machine Company, Philadelphia, Pa., and installed in the Gautier department of the Cambria Steel Company, Johnstown, Pa. The diameter of the steam cylinders and the stroke of the piston are 4 in. less in this engine than in the other, so that it is not quite so large, but it has other points of interest. It can be run either as a simple or a compound engine, is the first to be built in this country and is much

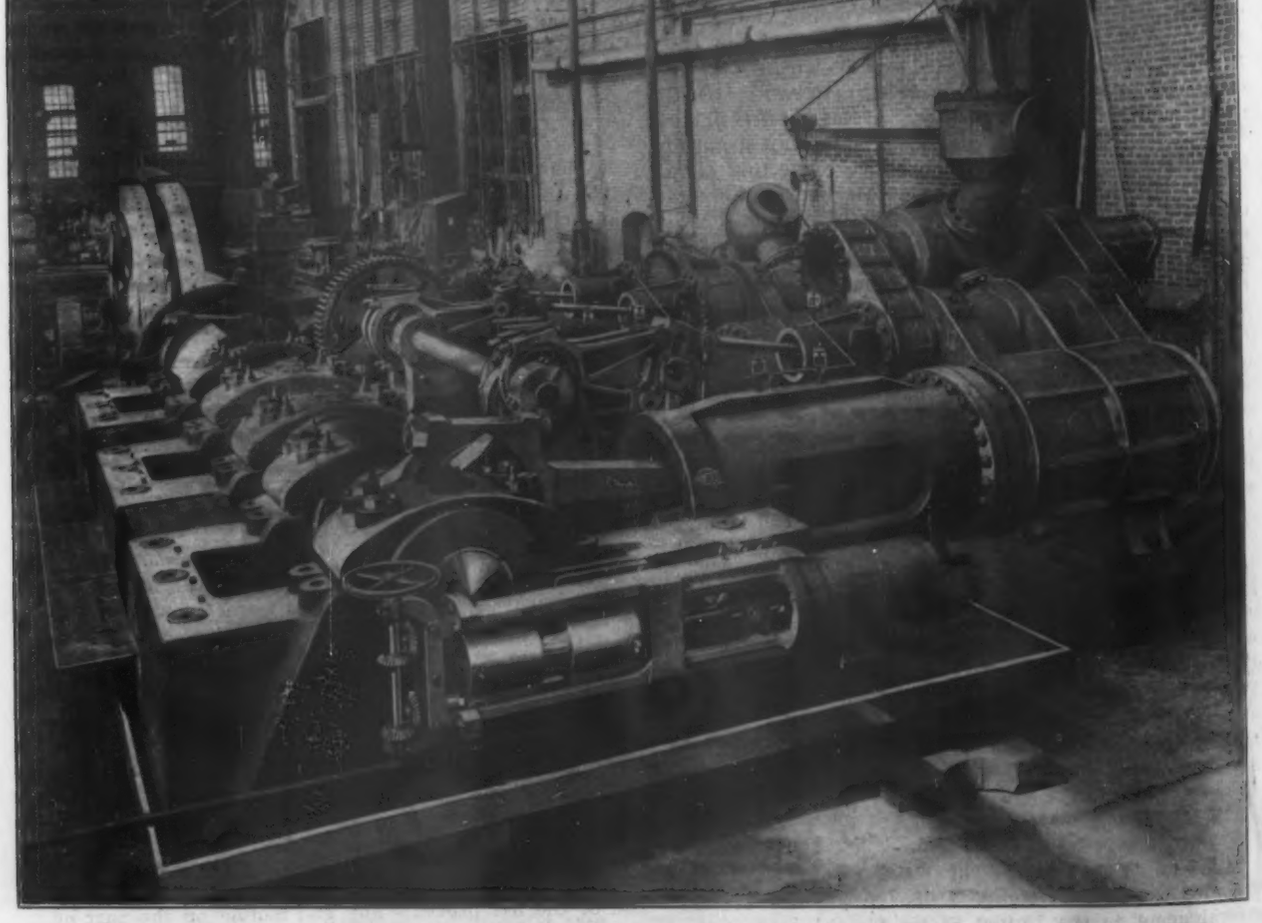


Fig. 1.—A Reversing Convertible Simple or Compound Engine in Process of Construction at the Plant of Its Builder, the Southwark Foundry & Machine Company, Philadelphia, Pa.

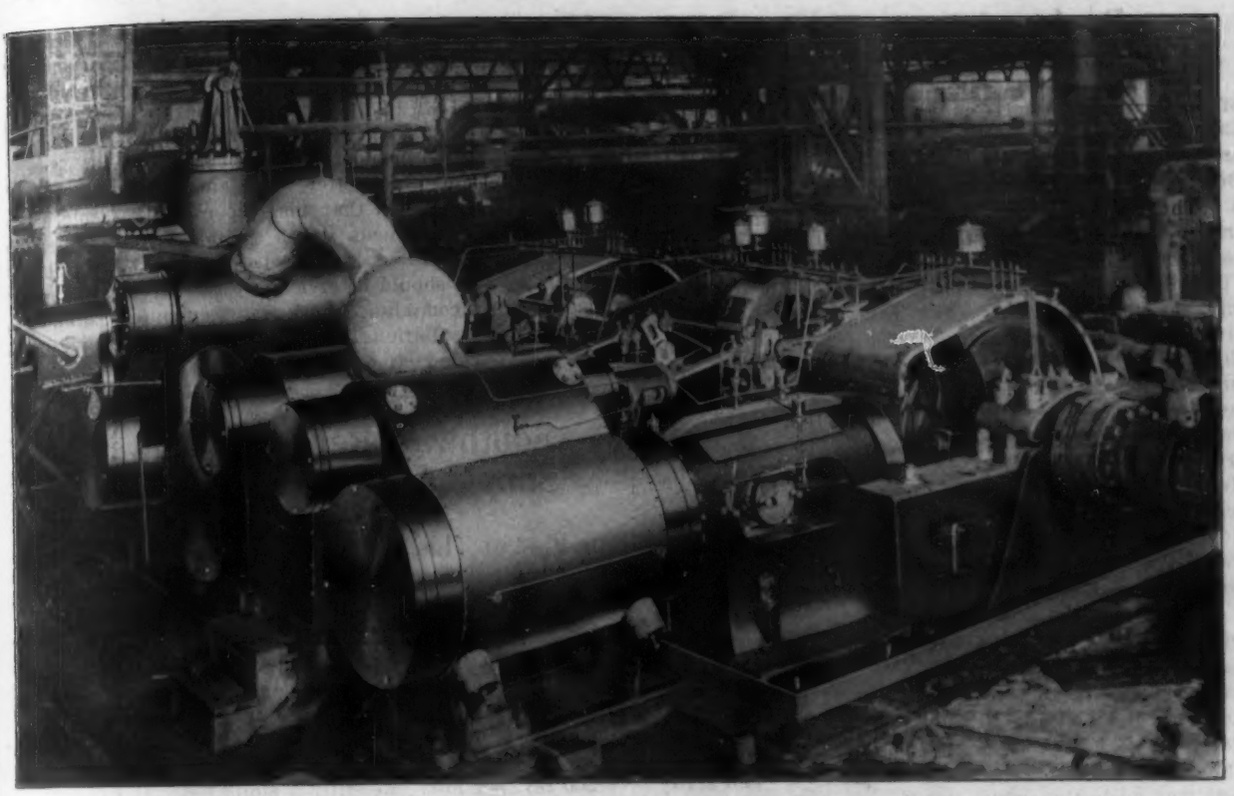


Fig. 2.—The Engine in Use for Driving a 24-In. Plate Mill in the Gautier Works of the Cambria Steel Company, Johnstown, Pa.

heavier than the other. Fig. 1 shows the engine in course of construction at the builder's plant, while Fig. 2 illustrates it in service for driving a 24-in. mill.

The engine is designed to operate at a pressure of 175 lb. per square inch and to run condensing. When used as a simple engine, steam at full boiler pressure is admitted to all three cylinders and exhausted directly into the condenser. The power developed under these conditions is in excess of 10,000 hp. When less horsepower is required this can be developed at a considerable saving in the amount of steam consumed by running the engine as a compound one. This change is accomplished by employing a converting valve located over the steam valve of one of the cylinders. The location of these two valves is clearly shown in the engravings. A small valve under the control of the engineer in the pulpit admits steam to the actuating cylinder, which moves the converting valve to a position where the high pressure steam only enters the end steam cylinder, from which it is exhausted into the other two and finally passes into the condenser. This arrangement gives a compound engine with a cylinder ratio of 2 to 1.

The point of cut-off in main cylinder can be varied from 75 per cent. to as small an amount as may be desired and the cut-off in the low pressure cylinders need not necessarily be the same as that in the high pressure one. The cut-off is adjusted by a motor which regulates the position of the stops against which the reversing gear comes to rest. A steam cylinder is used to reverse the engine.

The valve gear is a Gooch link motion, driven by nine eccentrics on a lay shaft above the main shaft. Using a lay shaft enables the main shaft to be shortened and gives a more compact engine, while at the same time comparatively smaller eccentrics and lighter moving parts can be used in the valve gear, thus greatly decreasing the inertia strains at high speed. Each link is driven by two eccentrics at the top and one at the bottom, which avoids the use of offset eccentric rods, having a certain amount of spring. All the valve gear parts are made to have only a direct push or pull without any bending, and all the steam valves are of the piston type.

Acheson Lubricants.—The International Acheson Graphite Company, Niagara Falls, N. Y., has become general agent in the United States for the sale of the new lubricants Oildag and Aquadag, products of the Acheson Oildag Company. The International Acheson Graphite Company makes Gredag, and by the new arrangement will be in touch with the sale of lubricants that meet any and all needs. Gredag contains disintegrated Acheson graphite and grease; Oildag is deflocculated Acheson graphite and oil, and Aquadag is deflocculated Acheson graphite and water. No other graphite, it is stated, is available in so many forms for the purposes of lubrication. All Acheson graphite is made in the electric furnace. Its production last year was over 13,000,000 lb., being far more than all the graphite mined in the United States in the same period.

The Badge Oilstone Holder

A new style of oilstone holder is being manufactured by F. J. Badge, 286 Taaffe Place, Brooklyn, N. Y. This tool holds triangular, square, round, or rectangular oilstones of ¼ to ⅜ in. sizes and any length up to 4 in. If desired the bar holding the stone will telescope into the handle sufficiently to hold a stone as short as 2 in. Dies and punches can be lapped and the cutting edges of tools

A Telescopic Oilstone Holder Made by F. J. Badge, Brooklyn, N. Y.

stoned much more easily as the stones are conveniently and comfortably held. As more pressure can be brought to bear upon the stone it will cut faster than if held in the fingers. Stones held in this device are not so apt to break and those which have already broken and are too short to be held in the fingers can be used effectively.

The holder consists of a V-shaped bar pressed from sheet steel with a saddle fitting loosely over the V and capable of sliding the whole length of the bar. This saddle is provided with a set of tongues under which the end of the spring holding the oilstone is slipped. The pressure exerted by this spring on the stone has a tendency to cant the saddle, thus causing it to grip the V of the bar and lock itself in position. An abutment at the end of the bar prevents any end motion on the part of flat stones which do not drop entirely into the V of the bar.

Special Massachusetts Fan Drives

Two Recent Installations Embodying Novel Features

The Massachusetts Fan Company, Watertown, Mass., has recently made two motor driven installations in which special means for driving the fans were employed. In one of these, problem of how to reconcile the slow speed required by a fan with the fast speed necessitated by the economical use of the power of a steam turbine or electric motor was solved, while in the other a vertical adjustable speed motor was used. Fig. 1 shows the installation made in the works of the American Bronze Company, Berwyn, Pa., where a reducing gear was employed between the fan and the motor to permit a high-speed motor to be used with a fan running at 300 rev. per min. The other installation, a diagram of which is given in Fig. 2, was at the Haverhill High School, Haverhill, Mass., and here a vertical shaft disk fan is driven by a belt connected vertical adjustable speed alternating current motor, the speed variation being secured by raising and lowering the armature.

The practice of using a reducing gear, as illustrated in Fig. 1, is one that is being watched by engineers with much interest, especially as it enables the steam turbine to be used for driving large fans in marine work. In this particular instance the economy secured in the space required is important, as, if a motor of the same power and operating at the speed of the fan had been employed, the space required would have been three times as great. To insure smooth operation and avoid vibration on the gear a flexible coupling is located between the motor and the reducing gear, which was furnished by the Power Transmission Gear Company, 96 Broadway, New York City.

The cone type of fan which requires no housing is used and the fan is located in a plenum chamber drawing the air through an opening in the wall at *a* and discharging it through the periphery of the wheel. This type of fan is especially useful where the amount of space available is not large enough to permit the use of an ordinary housed fan, while its ability to work against pressure in a number of cases makes it useful where the disk fan could not be employed. It is also used in heating systems in conjunction with either steam coils or hot air furnaces and insures a constant supply of fresh air.

In the other installation, a diagram of which is given in Fig. 2, the speed of the motor driving the fan through a belt was varied by raising and lowering the armature, and it was necessary to avoid a similar motion of the motor pulley. The drive which permits the motor shaft to be raised 3½ in. while changing the speed from 900 rev. per min. to 450 rev. per min. by the sliding armature control consists of three main parts. The bushing *a* is the first and is firmly keyed to the motor shaft *b*. Outside of the bushing are located the collar *c* and the flange pulley *d*, the latter being connected to the former by long bolts. Both of these parts have a bore that gives each a running fit on the outside of the bushing. Power is transmitted to the collar and the pulley by a sliding fit key,

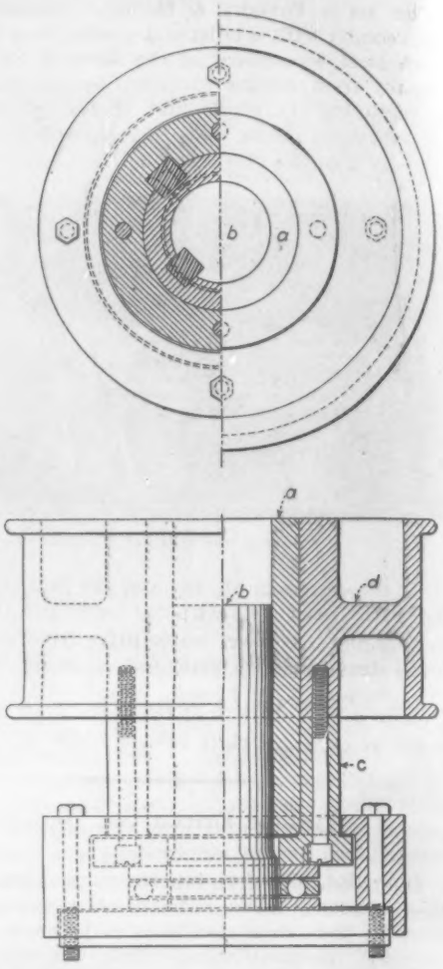


Fig. 2.—A Motor Driven Vertical Disk Fan Installed at the Haverhill High School, Haverhill, Mass.

which is screwed into a keyseat in the bushing. The weight of the collar and the pulley is carried by a ball thrust bearing located below the former and resting on the bonnet of the motor. The housing, which is bolted to the bonnet, serves to hold the various other parts of the drive in position.

This installation has been in operation for some time and the drive has proved entirely satisfactory. Its only wearing point is the ball thrust carrying the weight of the collar and the pulley, and here the friction is very slight, as the strain is entirely lateral. The fan used in this case is an 84-in. straight blade disk fan and is driven by a 5-hp. General Electric vertical adjustable speed alternating current motor.

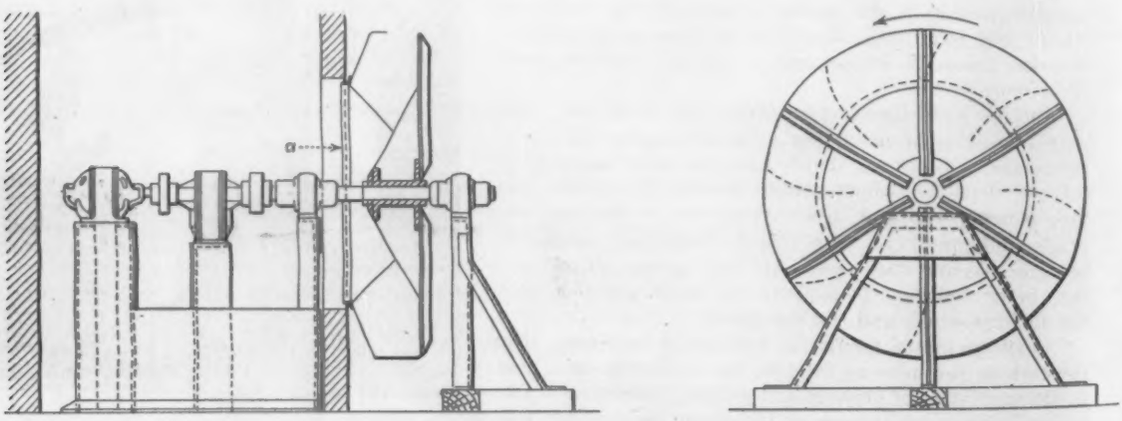
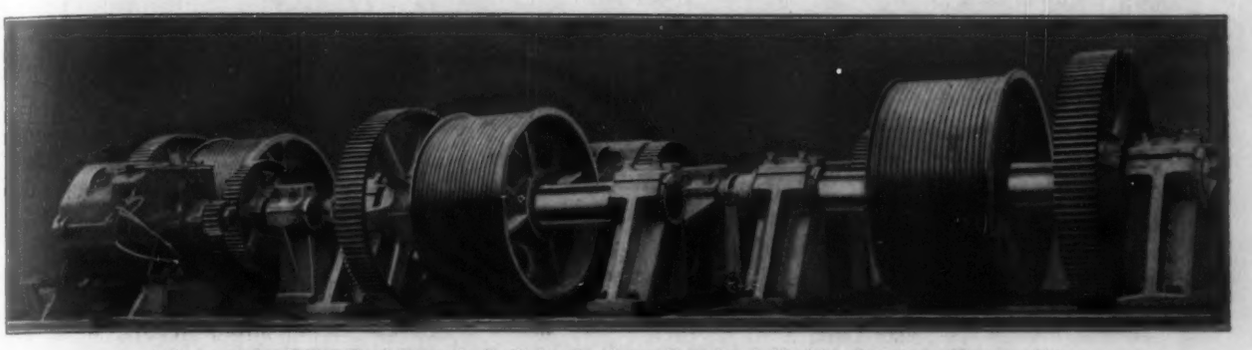


Fig. 1.—A Cone Fan with Reducing Gear Built by the Massachusetts Fan Company, Watertown, Mass.

The Aetna Billet and Scrap Hauls

The Aetna Foundry & Machine Company, Warren, Ohio, recently built a billet and a scrap haul for the open hearth steel department of the Jones & Laughlin Steel Company from designs furnished by the purchaser. In the engraving the single unit at the left is the scrap haul, while the double unit, both parts of which are connected by a sliding clutch, is the billet haul. The diameter of the drums is 5½ in., and the face width 25½ in. The gears are of steel with cut teeth, and the shaft is a steel forging. A direct motor drive from the jack shaft to the drum shaft is employed, a 75-hp. Westinghouse motor supplying the power. The diameter of the main latter is 6 in. and that of the main shaft is 9 in. The weight of each bed plate is over 10,000 lb.



A Scrap and a Billet Haul Recently Built by the Aetna Foundry & Machine Company, Warren, Ohio.

Turbine Driven Gas Blowers

The trend of modern practice in gas plants, especially those devoted to the manufacture of water gas, is clearly shown by data tabulated for the Terry Steam Turbine Company, Hartford, Conn. This tabulation gives full particulars of a large number of recently installed Terry steam turbine gas blowers, of which 25 have been in operation long enough to give reliable results. The most prominent fact gleaned from this tabulation is the increase in blast pressure necessary to give the greater output of up-to-date gas apparatus. Former pressures of 12 to 16 in. of water are now usually from 17 to 24 or more inches.

Of the 25 blower sets under consideration, the average air pressure at the blower outlet is 21 in., the maximum being 28 to 30 in. Only six of these were operated at outlet pressures of less than 17 in., while nine showed 23 or more inches.

Another important fact is the increase in speeds. The gas blowers must be driven at much higher speeds of revolution, a condition which has practically eliminated the belt drive of reciprocating engines. The steam turbine which permits of direct-connection is showing surprising adaptability. The direct connection eliminates belt troubles and does away with one bearing, three bearings being sufficient to support the shaft carrying both the turbine wheel and the fan wheel.

As shown by the tabulation, the speeds vary from 1550 revolutions per min. up to 3300, the variation being due to different sizes of blowers and different pressures maintained. Other advantages of the steam turbine for this service are the absence of internal lubrication, insuring exhaust steam free from oil, and the simplicity both in design and operation.

Australia is now making steel rails. Information has been received that the Lithgow Iron Works, Lithgow, New South Wales, has turned out its first steel rails. The steel was made in open hearth furnaces. The rails are stated to have been perfectly rolled, and at the time the news was forwarded they were in the hands of experts, being tested with a view to their acceptance by the Government railroad authorities. A bounty of $2.92 per ton is paid for all steel made from Australian pig iron.

The Kirk & Blum Adjustable Emery Wheel Hood

A new adjustable hood for emery wheels is being manufactured by Kirk & Blum, Cincinnati, Ohio, for use in connection with dust exhausting systems. The special features claimed for this hood are a trap which prevents clogging of the system, a simple adjustment affording the operator absolute protection from flying particles, and the employment of a lower velocity of air than that used with the average hood.

The arrangement of the trap does not allow small pieces or tools dropped from the operator's hand to enter the pipe and clog the system, a feature which eliminates the time and expense required for hunting through the piping system to locate large particles which have inadvertently got into it. Frequently the fan is badly damaged by these foreign substances, and in any event the system has to shut down until they are located and removed. A single movement of the arm draws the hood back and the adjustment is secured by a conveniently located thumb screw, there being no catches or fasteners of any kind. This hood is regularly built to take care of a 16-in. wheel, but the upper lip can be adjusted to accommodate a much smaller size.

A New Adjustable Hood for Emery Wheels Made by Kirk & Blum, Cincinnati, Ohio.

The American Society of Engineer Draftsmen will hold its regular meeting in rooms 1110 and 1111, 116 Nassau street, New York, on the evening of Wednesday, April 19. Henry L. Sloan is secretary-treasurer.

The Machinery Markets

There are indications that at least three railroads will soon become active purchasers of machinery, according to inquiries now before the trade in New York. Other railroads are buying more actively in the New York market than they have for some time, and the call from the general manufacturing trade is good. In other sections the railroad demand is not so brisk. Renewed activity in building and construction work is noted in Detroit, where the automobile companies are also very busy. Trade has increased in New England, where a larger volume of inquiries is also reported. An improvement in the automobile trade is also felt in that market. In Cleveland business is rather unsatisfactory, although there is a steady volume of small orders. The machinery demand is below normal in Chicago, although the Northwestern Railroad has been buying there and the Chicago packing plants have been purchasing for their repair shops. In Cincinnati local business is scarce, but some good trade is coming from the South, and sawmill equipment is meeting with good sales. The Philadelphia market lacks snap and the buying is irregular. Manufacturers of road machinery and bridge equipment are looking for some good business in Texas, resulting from the "good roads" agitation. An improvement in the demand for the heavier types of machine tools is helping the market in San Francisco, and there is a growing call for small shop equipment. The export business continues unusually good in all quarters.

New York

NEW YORK, April 12, 1911.

There are indications that a number of railroads will shortly become active in filling their machinery requirements, as their inquiries indicate that lists are being prepared. It is known that the Baltimore & Ohio Railroad has an extensive list in preparation, and it is reported that the mechanical departments of both the Seaboard Air Line and the Southern Railroad are collecting data with a view to making up lists of requirements. The New York, Ontario & Western Railroad has been closing orders against a large list it has had before the trade for some time. This list, it is estimated, calls for fully $75,000 worth of equipment. Some very good orders were placed with New York houses during the week, principally for machine tools. The New York, New Haven & Hartford Railroad is also showing signs of activity. This company will shortly make extensions to its electrical zone, and some good purchasing will no doubt ensue. A fair business was done by New York dealers outside of the railroad purchasing. The Simms Magneto Company placed some additional orders for machinery for its large plant at Watsessing, N. J., and inquired for a few more tools. Good sales were also made to the automobile interests, principally for machines required for installation in repair garages. Although foundrymen are not particularly busy, they are very good purchasers of mechanical equipment, such as molding machines, air lifts and cranes, and people in the general foundry supply business are experiencing a good trade. Second-hand machinery is scarce, especially in some lines of machine tools, and good prices are being taken for used tools.

The New York trade is bidding on two extensive automobile lists. The Saurer Motor Company, which recently took possession of the plant of the Quincy-Manchester-Sargent Company, Plainfield, N. J., has sent out a list calling for fully $50,000 worth of equipment, and the Pope-Hartford Auto Company is asking for bids on a list necessitating an expenditure of about the same amount.

Manufacturers of engines, boilers and power accessories are bidding against a large number of inquiries. Actual orders for this class of equipment have not been coming in in very good volume for the last six weeks, but inquiries have increased noticeably. It is apparent that the Public Service Corporation of New Jersey will shortly be a heavy purchaser of power equipment. The company intends making an addition to its power station at Coal street, Newark, and is also making improvements to its plant on the Hackensack meadows. Inquiries are coming in from the sugar plantations in Cuba and the British West Indies, although it is a little early for the usual annual buying movement from that source, as the sugar planters do not as a rule consider their mechanical requirements until after their crops have been harvested.

The Wrought Iron Casting Company, 126 Liberty street, New York, recently incorporated with $50,000 capital stock, has acquired a tract of land at Forty-eighth street and the Lehigh Valley Railroad, Bayonne, N. J., and is constructing a building 75 x 100 ft. as the first unit of a plant. This is to be the main building, and other structures will be erected as needed. A. A. Buehring is president of the company and W. E. Volz vice-president.

The Le Grand Bronze Company, Plainfield, N. J., has acquired a site at the foot of Forty-seventh street, adjoining the Lehigh Valley Railroad at Bayonne, N. J., and will build a plant for the manufacture of bronze bushings, the first building of which will be a foundry, one story, 40 x 80 ft., of reinforced concrete, equipped with cranes and eight furnaces. The company's plant and offices will be moved from Plainfield as soon as the buildings are completed.

Joseph Collier & Co., manufacturers of carriages and automobile bodies, 229 Halsey street, Newark, N. J., are planning for the erection of a four-story brick and limestone building, 67 x 100 ft., which is to be erected on Central avenue, near Seventh street, Newark. Edward Dunn, who has offices in the Firemen's Insurance Building, Newark, is now receiving bids for the construction of the factory.

The Celluloid Harness Trimming Company, 54 Ferry street, Newark, N. J., will erect a five-story brick and concrete factory building, 37 x 58 ft. F. A. Phelps, Newark, is the engineer in charge.

The Lippard-Stewart Motor Truck Company, Buffalo, N. Y., recently incorporated with a capital stock of $350,000, will establish a plant in that city for the manufacture of motor trucks exclusively. Thomas R. Lippard, president of the company, has until recently been general manager of the Franklin Automobile Company at Syracuse, and B. G. Stewart, who will be the company's chief engineer, was formerly mechanical superintendent of the Franklin Automobile Company. The company's present offices are at 851 Ellicott Square Building, Buffalo.

The United Indurated Fibre Company, Lockport, N. Y., has completed plans for extensive additions to its plant on Mill street, which will be commenced this spring.

The Upson Company, recently organized at Lockport, N. Y., to manufacture fiber specialties, will erect a new factory on the old Franklin Mills site in East Lockport at an estimated cost of $25,000. Chas. A. Upson is president, and Ralph M. Snell is superintendent of the new company. They were formerly connected with the Niagara Paper Mills Company of Lockport in similar capacities.

Contract for the construction of a pumphouse, filters, mains and intake has been awarded by the Board of Water Commissioners of Ogdensburg, N. Y., to L. B. Cleveland, Watertown, N. Y., at $79,850.

The Thompson Milling Company, Lockport, N. Y., which has recently been reorganized, will double the capacity of its flouring mill plant on Market street.

The L. C. Smith Bros. Typewriter Company, Syracuse, has commenced construction of an eight-story and basement addition, 54 x 201 ft., to its factory on East Washington street.

The Corning Glass Works, Corning, N. Y., Geo. B. Hollister, manager, is having plans prepared for a three and four story factory addition to its plant, the approximate cost of which will be $100,000.

The Domestic Appliance Company has been incorporated at Rochester with a capital stock of $60,000, and will establish a plant for the manufacture of special appliances and the conducting of a general machinery business. Among the incorporators are Louis W. G. Flynt, Wm. H. Cadwell, Harvey E. Corey and E. Schuyler Davis.

The Village Board of Trustees, East Aurora, N. Y., are receiving bids until April 18 for a sewage disposal plant and sewerage system upon plans of Frederick K. Wing, construction engineer, 910 White Building, Buffalo. D. N. Rumsey, Village Clerk.

The Universal Paint Company, Syracuse, N. Y., D. W. Rothensies, Reading, Pa., president, has plans under consideration for a large factory building at Syracuse.

The Wagstaffe Company, fruit preservers, Hamilton, Ont., will build and equip an extensive branch fruit preserving factory in the north end power district at Niagara Falls, which will employ 450 people. The directors of the United States branch company are James Wagstaffe, Herbert Wagstaffe and James W. Wagstaffe, Hamilton; E. H. Taylor, Niagara Falls, and Gordon F. Matthews, Buffalo, N. Y.

The Buffalo Machinery Company, manufacturer of jewelers' machinery, Buffalo, N. Y., has completed plans for a three-story brick addition to its plant at West and Forest

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avenues, that city. C. A. Svenson, president of the company.

The Simonds Mfg. Company, maker of saws and edge tools, which built an extensive plant at Lockport, N. Y., last year, contemplates the erection of an additional building this summer to cost $40,000.

The Huebner-Bleisten Patents Company, lithographer, Sidway Building, Main and Goodell streets, Buffalo, N. Y., is arranging to build an extensive lithographing plant in that city, to be equipped with special patented machinery controlled by the company.

Plans of State Architect Franklin B. Ware, Albany, are under consideration for a central heating plant for Cornell University, Ithaca, estimated cost $50,000 .

Chicago

CHICAGO, ILL., April 11, 1911.

Machine tool business is still below normal, though the market has a decidedly healthier undertone. The Northwestern Railway Company has made some purchases on the lists issued during the past two weeks, and further closings are expected to follow daily, as the amount purchased has been but a small part of the original list. Prominent Chicago packing plants have been buying supplies in this market for repair shops which are being added to Southern refineries located in Louisiana and South Carolina. Local sales are reported to be somewhat above those coming from outside points. A leading manufacturer of tinware, with plants in Chicago, has been an active machine tool purchaser during the week under review. Customers outside this immediate vicinity have been fairly liberal buyers throughout the week, purchases having been made by Kansas, Ohio and Wisconsin machine shops. The pulse of city trade seems to be a trifle stronger than that from the country, although an improved inquiry is felt in all quarters. The woodworking machinery dealers are exchanging congratulations over the month just passed, which has in many instances proved a record breaker. April business in this line of machinery is starting out well, though somewhat hampered by the large strike now affecting some of the principal furniture factories.

McDowell, Stocker & Co., prominent for many years in the machine tool business in Chicago, have gone into the hands of a receiver, Frank M. McKey, 1047 First National Bank Building, having been appointed to that responsibility by the United States District Court.

The Illinois Contracting Electrical Company, Rock Island, Ill., has been incorporated with a capital stock of $7000. The incorporators are W. W. Wilmerton, Martin McNealy, and F. H. Kelly.

The Independent Toll Clearing Company, Springfield, Ill. has been incorporated with a capital stock of $2500. The incorporators are M. B. Farwell, E. D. Glandon, L. A. Herrick, and C. R. Peel. The company will maintain telephone toll lines and exchanges.

The West Salem Hollow Brick & Tile Company, West Salem, Ill., has increased its capital stock from $2400 to $50,000.

The Union Light & Power Company, Minonk, Ill., has been incorporated with a capital stock of $100,000. The incorporators are Frank Z. Ames, S. C. Kipp, C. R. Robinson, and J. S. Webber.

The International Harvester Company, Chicago, is reported ready to proceed with the construction of a large machine shop at its works in Milwaukee, Wis. The building will be 145 x 203 ft., six stories, and of steel construction throughout.

The Pennsylvania Railroad Company, recently purchased the property of the old Toledo Rolling Mill of the Republic Iron & Steel Company, and will probably convert the buildings into repair and car shops.

The Jungers Stove & Range Company, Grafton, Wis., will erect three buildings for the manufacture of stoves and ranges. The first building erected is to be 48 x 140 ft., two stories, of reinforced concrete. Electricity will be used for both power and lighting.

Advices have been received from Webster City, Iowa, that C. H. Richeson, president of the Commercial League, is negotiating with parties who will build a $250,000 drain pipe and tile plant in that city. It is stated that $50,000 will be subscribed to the stock by Webster City citizens.

The Dubuque Packing Company, Dubuque, Iowa, is building a new packing plant just west of its present site. The structure will be entirely of reinforced concrete, and upward of $20,000 will be expended for new machinery, which will be electrically driven.

The Flick-Ziepprecht Box Company, Dubuque, Iowa, is erecting a new factory building to cost $15,000, which will enable the company to double its capacity. New machinery and an electric lighting system will be installed.

The Independence Canning Corporation, Independence, Iowa, is making radical changes in its establishment. The old factory has been torn down to make room for a larger one, 42 x 60 ft., and a warehouse, 80 x 100 ft., will also be built.

Des Moines men, headed by G. S. Gilbertson, have organized the Dakota Portland Cement Company, Chamberlain, S. D., which has a capital stock of $2,500,000. Mr. Gilbertson is president; B. H. Thomas, secretary, and W. J. Sonder, superintendent, all of Des Moines. The contract for the buildings has been let to the Des Moines Bridge & Iron Works.

The Diamond Calk Horseshoe Company, Duluth, Minn., has just completed the erection of a building, 50 x 75 ft., of steel construction, in which it is installing equipment removed from its old factory, to which four extra heavy forging machines will be added. Two more forging machines are yet to be purchased. The company also has plans prepared for a new horseshoe factory.

Sully, Iowa, will hold an election on April 10 to vote on the issuance of bonds for the installation of a water works system.

The Call Switch & Frog Company, Denver, Colo., incorporated with a paid up capital stock of $50,000, for the manufacture of the Call automatic railroad switch and other railroad supplies, has purchased a tract of four acres and will commence at once the erection of a factory. The stock of the company is owned by the Call Switch Company, an Arizona corporation formed in 1907. The factory will be modernly equipped throughout.

The citizens of Irene, S. D., will vote on the proposition of installing a water works system April 18.

Philadelphia

PHILADELPHIA, PA., April 10, 1911.

No important developments have been reported in the local market for either machinery or tools during the week. Buying in general continues irregular, and is still mostly confined to small propositions, although a fair volume of business is under negotiation, including several moderate lists, which have not come into the open market. Machine tool builders and industrial plants generally have been able to operate at an unchanged basis, but there is a lack of snap in the market, and few, except makers of special equipment, have order books in very satisfactory shape as far as forward business is concerned. The foundry trade, particularly makers of gray iron castings, report the demand as still being unsatisfactory; steel casting plants, however, find business to be slightly better. In no instance are plants being operated at a normal basis with any degree of regularity. In the second hand machinery trade an irregular demand is reported; buying is light and covers a wide range of equipment; first-class tools of recent make and in good condition are, however, always in demand. The boiler and engine trade has been without feature; a quiet business is moving with inquiries for moderate power equipment coming out from day to day.

Plans are being prepared for a four-story warehouse, 75 x 300 ft., of brick and reinforced concrete, to be erected on Tasker street between Water street and Delaware avenue, for John T. Bailey & Co., manufacturers of cordage.

The Excelsior Brass Company, Reading, Pa., held its annual meeting April 3, and the following officers were elected: President, Herbert E. Woodward; vice-president, George Wicklein; treasurer, Henry Etheridge, and secretary, Louis M. Gantert.

Plans are being prepared, it is said, for extensive improvements to the plant of the Beacon Light Company, Chester, Pa. While confirmation is lacking at this time, it is understood that the improvements proposed include the installation of a large coal conveying plant.

The Reading Crane & Hoist Company, Reading, Pa., is busy in all its various departments, and reports inquiries for cranes and hoists of different types as coming in quite freely. It is bidding on work in connection with a number of Mexican power plants. A special 84-ft. girder crane has been shipped to the Union Bag & Paper Company, Sandy Hill, N. Y., while several special cranes have been furnished the United States Government for use in the Bureau of Standards.

John L. Byrnes, Haddonfield, N. J., who is well known in the local machinery and machine tool field, has become associated with Cammell, Laird & Co., New York, representing Cammell, Laird & Co., Ltd., Sheffield, England, makers of special tool steels, and will represent the firm in this territory.

The County Commissioners of Berks County, Reading, Pa., will receive bids until April 26, for the erection of two concrete bridges, known as Bordners No. 1, to be erected over Tulpehocken Creek, at a point about seven miles from Robesonia, Pa., and Bordners No. 2, to be erected over the

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Swatara Creek, at a point about six miles from Myerstown, Pa.

Charters continue to be granted in considerable number by the State of Pennsylvania for small power plant companies, giving them the right to furnish power and light in their respective districts. These are largely underlying companies of large power producing interests. Twenty-five such companies, with a capital stock of $5000 each, of which W. A. Lathrop, R. H. Wilbur and H. F. Baker are named as incorporators, were granted charters last week to operate in Northampton, Lehigh and Carbon counties. These are understood to be operated in connection with the proposed extensive power plant system of the Lehigh Coal & Navigation Company. Charters for five companies of the same character have been granted interests in Luzerne County; these include the Wilkes-Barre Power Company, Wilkes-Barre Township Power Company, Hanover Township Power Company, Wright Township Power Company, and Ashley Power Company. Hazleton, Pa., is understood to be the headquarters of the operating interests.

The manufacturing department of the Philadelphia Metal Stamping Company, 2213 Chestnut street, was destroyed by fire April 6. The presses and other machinery will be replaced as soon as insurance adjustments have been made.

The Philadelphia Coppersmithing Company, 119 Florist street, has purchased adjoining property on which it will build an erecting shop of brick and steel, 61 x 133 ft. The company will build most of the equipment needed, as it is largely of a special nature.

The Lanston Monotype Machine Company, 1231 Callowhill street, is having plans prepared for a new building, 190 x 260 ft., eight stories at Twenty-fourth and Locusts streets.

Plans have been about completed for the new manufacturing building, 80 x 300 ft., six stories, to be erected at Beach, Palmer and Allen streets, for the American Can Company.

New England

BOSTON, MASS., April 12, 1911.

The general experience is that collections are improving, and business on the whole is in larger volume, following the usual influence of the spring season. The Boston dealers in pig and sheet metals report a considerable increase in orders. In fact, the change with them is very marked as compared to six weeks ago. This is always a good season with them, and possibly the improvement is no better than would normally be expected under existing conditions. Builders of heavy machines report an increase in the number of promising inquiries, but with little change as yet in the volume of business booked. The wire trade states that prices of copper products are more stable than has been the case recently. The wire business as a whole is very good, though reports from representatives in the West are not so encouraging as they have been. The machine screw manufacturers are finding business somewhat better, and in some cases are running nights in certain departments. The Pope Mfg. Company, Hartford, Conn., is adding largely to its equipment, having placed some large orders for machine tools. The improvement in the automobile trade is felt in New England, in common with the rest of the country, most of the factories being much more active than they had expected to be. The same thing is true of the manufacturers of parts and accessories, as is instanced with the manufacturers of drop forgings who report a notably better business. The dealers in machine tools do not note any special change in local conditions as they affect the trade.

The Farrel Foundry & Machine Company, Ansonia, Conn., manufacturer of heavy machinery and rolls, is erecting a large building, which will be an addition to the roll department.

The Milner Mfg. Company, Chicopee, Mass., has been organized to manufacture a new sanitary drinking fountain. The authorized capital stock is $100,000. Henry J. Milner is the president, Thomas A. McDonnell, vice-president, and Maurice Leahey, secretary. The factory will be located in Chicopee.

The National Iron Works, 61 Talcott street, Hartford, Conn., has established a business for the manufacture of ornamental and other iron work.

The New England machine tool builders will be represented in large number at the spring convention of the National Machine Tool Builders' Association at the Marlborough-Blenheim, Atlantic City, May 18-19. The programme will be an interesting one, with an excellent list of speakers. The chief topics of discussion will be shop efficiency and workmen's compensation and its allied principles.

Manning, Bowman & Co., Meriden, Conn., manufacturers of nickel and silver plate specialities, have made a large increase in capital stock, which will be issued as a stock dividend. The company has no plans for extending its works at this time.

The Ball & Socket Mfg. Company, West Cheshire, Conn., manufacturer of metal and wire specialties, states that the building which will be erected immediately will be used as a stockroom. It will be 40 x 86 ft.

The most important announcement of industrial expansion in New England outside of the metal trades is that of the Pilgrim Mills, Fall River, Mass., which will build a cotton factory to cost $1,000,000 in that city. The plans call for a three-story spinning mill and a two-story weave shed, covering a total area of 132 x 594 ft. The original equipment will consist of 50,000 spindles and 1200 looms. The mill will receive its power from the local electric power company, which will constitute an experiment in cotton mill practice. Other increases in manufacturing facilities in this territory follow: William Skinner & Sons, Holyoke, Mass., silk manufacturers, mill building 60 x 240 ft., four stories, to cost $100,000; Harvard Knitting Mills, Wakefield, Mass., mill building 90 x 180 ft., three stories; Worcester Cold Storage & Warehouse Company, Worcester, Mass., addition 80 x100 ft., two stories; Goetz Silk Mfg. Company, Holyoke, Mass., silk manufacturer, three-story brick mill, 50 x 250 ft.; Celluloid Starch Company, New Haven, Conn., three-story building, 40 x 60 ft.

The carpet plant of the Cochrane Mfg. Company, Dedham, Mass., was burned, April 4, with estimated loss of $200,000.

New England communities were never so alive to the desirability of organized action in increasing their prosperity. Boston, Providence, Portland and other seaport cities and towns are moving toward improved terminal facilities and increased dockage. Large plans are being carried forward at Providence. New London hopes to see its splendid harbor selected as the terminal of great steamship lines which now dock in New York and its immediate vicinity. The extension of the Grand Trunk system through the Vermont Central from Palmer, Mass., to Providence, will assist in the development of a number of manufacturing centers, and now the New York, New Haven & Hartford announces that it may parallel that line, electrically, to complete its connections for the Canadian traffic. Not a few enterprises are under way with the purpose of creating industrial funds with which to assist small manufacturing concerns in their growth. The various boards of trade and chambers of commerce are getting together in combination with the idea of furthering the interests of New England.

Several names well known in the metal industry are included among the incorporators of the Meriden Board of Trade Industrial Corporation, Meriden, Conn., the charter of which permits it to lease and deal in industrial property. The authorized capital stock is $100,000, and the incorporators are Robert W. Carter, George H. Wilcox, William H. Lyon, C. F. Rockwell, and C. H. Fredeminck, all of Meriden.

The Standard Machinery Company, Providence, R. I., has brought out a new type of rolling mill having various special features. The machine will take a maximum length of roll of 22 in., and a minimum of 10 in. face and 12 in. diameter. It is specially designed for the rolling of large sections of copper moldings, automobile rims, &c., and also for the rolling of sheet steel, copper, zinc, german silver and nickel, and for the breaking down of the ingots of precious metals, reducing them to a thickness of about ⅛ in.

The general understanding is that the New York, New Haven & Hartford Railroad will electrify its system as far as New Haven on the New York end, within the next year or two, and possibly will begin a similar work in Boston. Reports differ, but this is the popular opinion of the railroad men, who base their belief upon a statement recently made by one of the company's prominent officials.

The Charles Greiner Company, New Haven, Conn., manufacturer of riveting and spinning machines, was a sufferer by a fire which destroyed the building, April 8.

Cincinnati

CINCINNATI, OHIO, April 11, 1911.

Several machine tool builders report an improvement in both orders and inquiries, but this is not general. The South continues to furnish some fairly satisfactory business, but orders from nearby territory are scarce. Transactions in second-hand machinery are not very numerous, although both new and rebuilt sawmill equipment is moving more satisfactorily. Manufacturers of valves and fittings are very busy, and it is notable that the export business in these engineering specialties has been very good lately.

A large number of Cincinnati members of the National Metal Trades Association left in special cars, over the Penn-

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sylvania Railroad, to attend the annual convention in New York.

The new additions to the plant of the R. K. LeBlond Machine Tool Company, in East End, Cincinnati, are nearly completed, and installation of the equipment will be finished before the fall season begins.

The Cincinnati Lathe & Tool Company confirms the report as to moving its Spring Grove avenue plant to the Oakley district. Plans for the new buildings are being drawn and the company expects to occupy its new home before the beginning of the fall season.

The Imperial Motor Car Company, Cincinnati, has taken out a permit for the erection of a $20,000 garage.

The bottling house addition to the plant of the Hudepohl Brewing Company, Cincinnati, recently mentioned, will be a two-story structure, of mill construction, and will cost about $35,000.

C. J. McDiarmid, receiver for the Cincinnati Punch & Shear Company, announces that all the equipment in this plant will be auctioned off, in separate lots, by the Ezekiel & Barnham Company, Cincinnati auctioneers, April 19. A number of outside bidders are expected to be present at this sale.

Some power equipment will probably be required by the F. C. H. Manss Company, Cincinnati, printer and engraver, who has plans made up for a two and one-half-story concrete building that will be erected on Burnet avenue, at an estimated cost of $45,000.

The John Grossius Furnace Company, Cincinnati, has purchased a portion of the former home of the Victor Safe & Lock Company, on East Eighth street, and it is stated, will add two stories to present building. This will give the company a manufacturing plant about 75 x 75 ft., four stories.

The H. R. Irwin Mfg. Company, whose Cincinnati plant for the manufacture of washing machines was recently destroyed by fire, has leased a building close to its old site, in which is now being installed special machinery that will double its output.

The General Electric Company, Cincinnati, entertained 25 of its outside salesmen, April 8, with a banquet at the Sinton Hotel. H. C. Houck acted as toastmaster.

The Cincinnati Steel Castings Company, Cincinnati, has acquired a new site on which will be erected a new plant. The proposed building will be about 75 x 150 ft., two stories, and of brick and steel construction.

The Scheiffele Shoe Company, Cincinnati, expects to begin work shortly on a large addition to its factory.

Harry Hake, architect, Cincinnati, has charge of the plans for the new power building, recently mentioned, to be erected for A. J. Anderson.

The Pioneer Pole & Shaft Company, Piqua, Ohio., manufacturer of poles and shafts, has plans prepared for the erection of a large new plant.

Cleveland

CLEVELAND, OHIO, April 11, 1911.

While the demand for machine tools is a little more active than during the greater part of March the condition of the trade is still unsatisfactory. There is practically no business coming from the railroads and very little from the large manufacturing plants. There is a steady volume of small business, but few orders are for over two or three tools. The local manufacturing situation shows some improvement, quite a number of the shops having increased their working forces somewhat during the past two weeks. The automobile plants in Ohio and Michigan are mostly running at or near their full capacity at present, and the volume of recent orders is claimed to have been quite satisfactory. The automobile makers this year are following a conservative policy, and are not making cars in excess of the demand. Some of the makers are already preparing to get out their 1912 machines, and are placing orders for the parts for these cars. Machinery dealers, however, are looking for very little business from the automobile industry during the year. The demand for second-hand machinery is moderate and the supply not large. In the local foundry trade conditions show no change, the demand for castings being somewhat light.

At the annual meeting of the American Mine Door Company, Canton, Ohio, held April 3, it was decided to enlarge its plant to double its present capacity and to install a new power plant. An extension, 60 x 150 ft., will be built to the present plant. Officers were elected as follows: Major A. Vignos, president and treasurer; R. J. Diebold, vice-president; Alfred Vignos, secretary; N. K. Bowman, general manager.

The Jeffries Electric & Mfg. Company, Cleveland, has been incorporated with a capital stock of $10,000 by S. S. Jeffries. H. W. Culbertson and others.

The Standard Galvanizing & Mfg. Company, operating a plant at 726 Canal road, Cleveland, has taken out incorporation papers with a capital stock of $15,000. The incorporators are Samuel G. Catchpole, G. T. Bander, E. W. Cheeltham, Victoria Cheeltham and C. T. Denby.

The Biggs Boiler Works Company, Akron, Ohio, will enlarge its plant by the erection of a brick and steel addition, 120 x 225 ft. The new building will be used as an erecting shop, machine shop, flanging shop. A power plant will be installed. All of the machinery will be motor driven.

The Lorain Metal Products Company, Lorain, Ohio, has been formed to manufacture various metal products. The company will effect a consolidation of the Stander foundry, the O'Brien Brass Works and the B. R. Maddock Pattern Works. The company will operate in the Stander foundry plant. B. R. Maddock will be the manager. The plant is located at Thirty-fifth street and Elyria avenue.

The Acklin Stamping Company, Toledo, Ohio, recently incorporated to manufacture stamped metal articles, has broken ground for a new plant on Dorr street. The company will shortly be in the market for its machinery equipment.

The City Council of Canton, Ohio, has authorized Service Director Harbert to expend $17,000 for electrical equipment for the new auxiliary pumping station in that city.

The Buckeye Iron & Brass Works, Dayton, Ohio, will erect a new foundry. The building will be of concrete, 83 x 159 ft.

A new plant is being established in Newton Falls, Ohio, by F. B. Hall for the manufacture of an iron flexible ladder, Mr. Hall having acquired the rights and equipment of the Wheeling Flexible Ladder Company.

The Rock Creek Basket & Veneer Works, Rock Creek, Ohio, will build a new plant 63 x 120 ft.

It is announced that the Wolfgram Marble Company, recently organized with a capital stock of $300,000, will build a large plant near Port Clinton, Ohio, for the manufacture of cement products. Frank Wolfgram and others are interested in the company.

The American Metal Screen & Weather Strip Company, 2460 East Grand Boulevard, Detroit, Mich., is being reorganized, and is in the market for some sheet metal working machinery for stamping window screens and weather strips.

The Sandusky Portland Cement Company, Sandusky, Ohio, is spending $125,000 in the enlargement of its plants at Bay Ridge, Ohio, and Dixon, Ill.

The Defiance Carriage Company, Defiance, Ohio, is planning the erection of an $8000 factory building.

The Brookside Machine & Repair Company, Cleveland, has been incorporated with a capital stock of $10,000. M. Debold, Conrad Marquart, S. N. West and others are the incorporators.

St. Louis

ST. LOUIS, MO., April 10, 1911.

The Curtis & Co., Mfg. Company will enlarge its steel plant at Hamburger and Kienleu avenues.

The St. Louis Frog & Switch Company will enlarge its plant to provide for the installation of additional forging machines.

The Emerson-Bishop Refrigerating Machine Company, St. Louis, Mo., has been incorporated with $400,000 capital stock. The company plans the erection of builders to cover about one acre and will install machinery to manufacture refrigerating machines from 150 to 2000-lb. capacity. The company makes a specialty of family machines.

The Automatic Tire Company, St. Louis, has been incorporated with a capital stock of $25,000. The incorporators are N. W. McLeod, W. E. Grayson, T. M. Dees, and E. A. Pelton. The company will engage in manufacturing all kinds of tires.

The Stephen J. Gavin Lumber Company, St. Louis, has been incorporated with a capital stock of $50,000. The incorporators are Stephen J. Gavin, Julius E. A. and Katharine A. Gavin. The company will engage in the lumber and mill business. Two planing mills will be built, one at Spring and Cass avenues, and the other at 6400 Easton avenue.

The Saunders Car Stopper & Equipment Company, St. Louis, has been incorporated with a capital stock of $250,000. The incorporators are D. R. Saunders of Columbia, Miss.; S. J. Henry, Lawrence Boswell, J. F. Bartman, and S. T. Hatcher of St. Louis. The company will manufacture a corrugated car-stopper for steam railroads, to be used in place of the present bumping posts. A plant will be erected in St. Louis.

A company to be known as the Scott Gasoline Rock Drill

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Company is being organized in St. Louis. The Capital stock is $500,000. The incorporators are Louis L. Scott, John R. Williams, Samuel D. Martin and others. Frank Wyman, former postmaster, has assisted in the formation of the company, and the measures for perfecting the machine, which is a rock drill that is attached directly to the cylinder of a gasoline engine, obviating the use of a steam plant, air compressor and hose in drilling rock and other substances. Later on the company intends to have its own shops in St. Louis. At present the machine will be manufactured under contract.

The Hannibal Wagon Company, Hannibal, Mo., is improving its plant by the erection of new buildings for its paint department, warehouse and shipping rooms. The present buildings are also being rearranged. The capital stock of the company has been increased to $75,000.

The Ozark Hickory & Cob Pipe Company, Cuba, Mo., is building a factory in that town. Jacob Weisbaum is the superintendent.

The Ozark Water Mills Company, Ozark, Mo., has increased its capital stock from $25,000 to $39,500.

The Meyers Pump & Mfg. Company, St. Joseph, Mo., has been incorporated with a capital stock of $60,000. The incorporators are D. W. Hall, W. M. Meyers, and M. M. Garver. The company will manufacture an automatic stock pump, automatic hay forks, gasoline engines and other machinery. It has established a plant on Seventh street.

H. F. Rush and Starling White, Hillsboro, Ohio, will soon start on the construction of a building in Stuttgart, Ark., for use as a foundry. The owners propose to do a general repair and casting business, and later engage in the manufacture of cane and feed mills.

The Tulsa Portland Cement Company, Tulsa, Okla., has been incorporated with a capital stock of $300,000. The directors are C. F. Tingley, H. R. Crews, L. F. Barnes, J. O. Mitchell, J. W. McCloud, O. H. Leonard, H. C. Ashby, J. E. Crosbie, and Chas. Huonker. The company will erect a 700-bbl. cement plant near the city.

Detroit

DETROIT, MICH., April 10, 1911.

April is witnessing renewed activites in building and construction work. March was quiet in this regard owing to the winter weather that prevailed throughout. The past week has seen the beginning of operations on several new office buildings. Factory construction work is not as active as it was last year at this time, several big automobile concerns having moved into their new plants this spring. April will see many spring orders for motor cars, but it is doubtful if it will reach the high mark set last month. Automobile companies throughout the State are running to their limit. F. S. Holmes of the Jackson Automobile Company states that the market will be bare of cars within 30 days.

The plants of the General Motors Company in this city and Pontiac have been inspected by several New York officials, and their report calls for enlargements to the Cartercar and Oakland branches at Pontiac, and to the E. M. F. plant of this city. This corporation has leased the property formerly occupied by the Ellis-Ford Pipe Company, which is opposite the main factory, with the purpose of building an additional structure.

The Detroit Clothes Pole Company has been incorporated to make a patent clothes pole attachment. The company is starting with a small capital stock, but is on a firm basis. Harvey O. Knickerbocker is the principal stockholder.

The Alden-Sampson Company, which recently moved its plant from Pittsfield, Mass., has increased its capital stock $500,000 to $2,500,000. This will give the plant every facility in increasing its output.

Another motor car company to increase the size and facilities of its plant is the Anderson Electric Car Company. The company has voted to increase its capital stock from $1,200,000 to $2,500,000. This concern makes the Detroit Electric, and has of late turned its attention to the manufacture of high powered electric trucks, using the improved Edison batteries. It is understood that the increase in capital is to allow more development in this line.

The Yeomans Body & Box Company is building a large addition to its plant in this city. The new plant will adjoin the main factory and will greatly enlarge the operations of the company.

The Reynolds Motor Boat Company, whose plant is near Grosse Pointe, Mich., a suburb of this city, has increased its capital stock from $40,000 to $100,000. The capital will not be used in plant addition, but for business purposes.

By the use of $100,000, the increase to the present capital stock, the Michigan Smelting & Refining Company will begin the erection very soon of an entirely new plant. The company states that at this stage it is not in the market for any new machinery, but will be later on.

The Purvis Engineering Company has filed articles of incorporation with the Secretary of State with a capital stock of $10,000. The company will engage in structural work of all kinds.

R. A. Carmichael & Co. of this city have incorporated to manufacture drugs, perfumes and toilet waters. The company has plenty of capital and will do a wholesale business. The capital stock is given as $40,000.

Forrest L. Jordan, Lansing, Mich., has the organization of a company under way to manufacture a sanitary combination sink and pump frame, an invention of his own. The plant will be located at Hastings.

The Lowell Cutter Company, for the purpose of expansion in the way of larger quarters, has added $50,000 to its present capital stock of $75,000.

The Cadillac Creamery Company has incorporated with a capital stock of $10,000. The company will erect a new factory, and will install modern butter making machinery. The plant will be located at Cadillac, Mich.

The Cadillac Veneer Company, Cadillac, Mich., will construct an addition to its plant in the way of a new concrete factory, 35 x 55 ft. in size. The new building will be used as a machinery shop.

The Soo Building Supply Company is the name of a new concern incorporated at Sault Ste. Marie, Mich., to manufacture building supplies. Kenneth Wright is president.

Hillsdale, Mich., voted to spend $10,000 for electric light plant improvements at the April election.

The Trick-Bar Company has been incorporated at Lansing, Mich., with a capital stock of $20,000. The principal stockholders are Edwin M. Smith and John D. Goldsmith, both of Allegan. The company will make gymnasium apparatus.

The Dudley Paper Company, Lansing, Mich., is planning a reorganization of the company, which has entirely outgrown its quarters. Representatives are in Cincinnati conferring as to increasing the capital and size of the plant.

The Hildreth Motor Company is another Lansing plant to plan enlargements to its plant. The firm will erect a large addition, 50 x 112 ft. to the main building, part of which will be used for a temporary stockroom.

The Michigan Carton Company, in order to allow operations on a more enlarged scale, has filed notice of an increase in capital stock from $100,000 to $400,000.

A project that will require a number of miles of pipe is the proposed co-operative plan of Saginaw and Bay City, Mich., to connect their water supply with Saginaw Bay or Lake Huron. The distance is 56 miles, and it is estimated the undertaking will require $2,000,000.

The Brinkerhoff Piano Company, Brazil, Ind., is seriously considering moving its plant from the former city to Charlotte, Mich. The company formerly was located at Charlotte, but went to the Indiana city in view of a $60,000 bonus.

Another furnace Company for Marshall, Mich., is the Simons-Ludle Furnace Company, whose capital stock is $5000. Marshall is becoming famous for its furnace factories.

The Johnson Optical Company suffered the loss of its four-story plant in this city last week. The loss will amount to about $75,000, with $50,000 insurance.

Baldwin, Tuthill & Bolton have their plans complete for additions to their plant at Grand Rapids, Mich. A new building, 70 x 85 ft., will adjoin the old structure, and when the machinery is moved to the latter building, the plant occupied as a machine shop, on Sixth street, will be torn down and replaced by a building 150 x 180 ft. The Baldwin, Tuthill & Bolton saw fitting plant is the largest in the world.

Big Rapids, Mich., voted to spend $25,000 in securing industries for the city. The city is prepared to offer some good inducements to progressive concerns.

The Bainton Electric Steel Company, which was incorporated a few weeks ago, announces that it has purchased a site of six acres in Buchanan, Mich., and will erect a plant thereon to cost $75,000.

Business men of Cadillac, Mich., have nearly completed the organization of a company with a capital stock of $100,000, to be known as the Cadillac Chair Company. J. N. Perkins of Otsego is to be business manager.

The Detroit Milling Company, which suffered a complete loss by fire of its plant at Adrian, is laying plans for rebuilding. The company lost all its machinery, and in case of rebuilding will be in the market for an entirely new outfit.

Bids are being received up to April 24 by the Government for the dredging of Saginaw River. The last Congress appropriated $686,000 for this work, and the task will involve the use of some modern dredging machinery.

The Bates & Edmunds Motor Company, Lansing, Mich., will make use of the $25,000, the recent increase in capital stock, for improvements to the plant.

The American Hydrostat Company, which was organized

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last week with a capital stock of $50,000, announces that it has purchased machinery sufficient to get the plant going nicely, but will require more later on. The company has patented a hydrostat to control the water supply of boilers, preventing accidents from low water. William C. Kirby of Windsor, Ont., has the organization in hand.

The Chas. H. Osborn Company, Vicksburg, Mich., maker of vacuum cleaners, will move its plant to Hastings. It recently added improvements to its machine and will increase the size of the plant upon its change of location.

A company has been perfected at Holly, Mich., supported by plenty of capital, for the manufacture of road building machinery. The new company will occupy the former plant of the Cyclone Fence Company.

The Battle Creek Paper Company, Battle Creek, Mich., will commence work at once on the construction of an addition, 100 x 130 ft., two stories and basement, which is to be occupied by several different departments.

The Eclipse Motor Works, for many years located in Mancelona, Mich., will move its plant to Traverse City, where it will be merged with the Traverse City Iron Works.

San Francisco

SAN FRANCISCO, CAL., April 5, 1911.

While the demand for machine tools of the heavier types is still limited, a material improvement has taken place within the last few weeks. One local firm reports the largest month's business in more than a year on tools of ordinary type and capacity, and inquiries for small shop equipment are increasing. The nature of recent business is regarded as an indication of favorable conditions in the metal working industries through the State, and a fairly active movement is expected this summer. The outlook for large tools is less promising, as there are few inquiries in the market at present, and many local shops continue to work considerably below their present capacity.

The manufacture of pumping machinery is one of the most active lines in this territory. The demand for irrigating pumps is increasing with the approach of summer, and there is an unusually large inquiry for water works machinery, largely in connection with municipal projects. Electric power equipment appears to be more active in the north than in California at present, but several large projects are under way in this State, which will probably result in business later in the year. Several of the northern California mines are coming into the market, and some orders from this source have already been booked.

There has been quite an active movement of sawmill and logging equipment, and some orders are still coming out, though it is thought that the largest requirements in this line have been filled. Substantial orders are coming from a number of the large wood working plants in Oakland and at outside points, which are replacing old equipment with high-speed machines in preparation for the summer rush.

Owing to changes in the plans, with the object of increased capacity, the opening of the Pacific Coast Steel Company's new plant at South San Francisco has been postponed, and will probably not take place before July.

The Doak Sheet Steel Company, controlled by the same interest as the Pacific Coast Steel Company, has sold out its sheet metal business, with a plant at Eighth and Irwin streets, to the Ames-Irvin Company.

B. F. Yates, president of the Berlin Machine Works, Beloit, Wis., was in San Francisco at the end of last week, visiting the California agents, Tenshaw, Bulkley & Co. Mr. Yates announces definitely that a branch factory, representing an investment of about $1,000,000, will be installed by his company in Oregon or Washington, the exact location to be decided shortly.

The Pacific Gear & Tool Works is putting up a two-story brick shop building at Columbia Square and Folsom street.

The Western Boiler & Steel Company has been incorporated at Los Angeles, with a capital stock of $50,000, by G. W. Darby, D. M. Ward, R. B. Hayes, A. W. Gordon and F. S. Hutton.

The Cyclops Iron Works, this city, has secured a large lot on Folsom street near Fourth, where it is planning to erect a concrete foundry building.

Bids will be opened May 1 at the local United States Engineer's office for a 12-ton revolving steam crane. The Government engineers will also call for bids shortly for two steel-hull suction dredges with 20-in. pumps for use on the Sacramento River near Yuba City.

Contracts have been let for the erection of a power station at the navy yard at Mare Island, Cal. Officers at the navy yard have been instructed to be prepared for the work of installing oil burning equipment in vessels at short notice.

The Craig Shipbuilding Company, Long Beach, Cal., has just completed a large steel steamer. The company has floated a $250,000 bond issue.

The Lee Railway Switch Device Company has been incorporated at San Diego, Cal., with a capital stock of $500,000, by T. E. Lee, J. W. Hastain, J. C. Hocker, C. F. Mohnicke, W. A. Brown, D. S. Miller, and W. V. O'Farrell. The company intends to manufacture and market a patent switch.

The A. Jensen Company, Eureka, Cal., manufacturer of creamery machinery, expects to move its plant to Oakland, Cal., the coming summer.

The Artesia Company has been organized at Los Angeles by J. W. Jennings, M. H. Harris and E. Scott. The company intends to equip a shop for the manufacture of a patent well drill.

The town of Pleasanton, Cal., is in the market for a pump of 30,000 gal. per hour capacity.

The Machinery & Supply Company, San Francisco, has moved from 61 Fremont street to Seventh and Harrison streets.

The San Joaquin Light & Power Company has placed orders for generating equipment of over 6000 hp. capacity for the new steam plant at Bakersfield, Cal.

The town of Madera, Cal., is contemplating the installation of an electric generating plant, to furnish current for lighting and power for the water works.

The Pacific Gas & Electric Company is planning a large auxiliary steam power plant to be installed at Sacramento, Cal.

Norman B. Livermore & Co. have placed orders with the Hilles & Jones Company for an outfit of boiler tools, and now have all the equipment required for their new shops in South San Francisco. They expect to occupy the new quarters in about a month. They have recently booked an order for a large Mallet locomotive, to be delivered to Salt Lake City, and report considerable activity at the local shops on repair work for the Southern Pacific.

L. C. Bihler, traffic manager of the Carnegie Steel Company, is visiting the San Francisco office.

The Palmer Lumber & Mfg. Company, Chehalis, Wash., is erecting a new factory in that city, the equipment of which will be electrically operated by individual motors.

The Standard Brass Casting Company, Oakland, Cal., has under construction a new foundry building, 100 x 100 ft., two stories, of brick construction. Additional oil furnaces giving a total capacity of 7000 lbs. per heat, and a new five-ton traveling crane are being installed. The company expects to occupy the building by May 1, and will add special foundry equipment from time to time.

The South

LOUISVILLE, KY., April 11, 1911.

Business is reported to be satisfactory in most lines represented in this market. The demand for power equipment is unusually good, several large orders having been booked during the past week, while ice machinery is also selling at a rapid rate. The sales of electrical equipment have been fair, while quarrying machinery has been in better demand than for several weeks. A lot of inquiries for equipment of this kind have been received, and some good business is in prospect. Machinery dealers report an unusually good call for contractors' outfits.

Business with the Henry Vogt Machine Company is excellent, two orders having been received last week for 300-hp. water tube boilers, in addition to four ice machines of large capacity.

The James Clark, Jr., Electrical Company reports a fair demand for dynamos and electrical appliances.

An order has been placed with the New Albany Mfg. Company, New Albany, Ind., for the equipment of a small cut-stone plant for the Bowling Green Quarries Company, Bowling Green, Ky. The Bowling Green oolitic limestone district is undergoing rapid development, and that territory is looked upon as a large prospective consumer of power and quarrying equipment.

The Schoppenhorst Dry Cleaning & Dyeing Company, Tenth and Grayson streets, Louisville, has had plans drawn for an electric power plant to cost $10,000. The company recently installed individual motors for the operation of its machines, the Fairbanks-Morse Company supplying them.

H. E. Mechling, Louisville, will erect a modern laundry plant on Broadway, between Sixth and Seventh streets, in the near future, and will be in the market for power and laundry machinery. He is proprietor of the Swiss Cleaners & Dyers Company, Louisville.

Bids on a steel bridge, with concrete piers, which is to

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be erected over Salt River between Jefferson and Hardin counties, will be opened in the office of Commissioner Charles F. Taylor, Louisville Trust Building, this city, April 20. The structure will be 800 ft. long and will probably cost $75,000.

W. J. Semonin, president of the Commercial Club of Jeffersontown, Ky., has announced that Louisville capitalists have practically completed plans for an electric light and power plant to be erected there. The plant will be exempted from taxation for 10 years.

Fred Erhart, Louisville, is drawing plans for an addition to the Capitol Hotel, of this city, which will include an electric light and ice plant. The cost of the improvements will be $20,000.

Capt. Brinton B. Davis, Louisville, is architect for the new Henry Watterson Hotel to be erected in this city at a cost of $650,000. It will have its own electric light, power and refrigerating plants. It will be built of reinforced concrete.

The Farmers' Home Hotel, Louisville, has been reorganized under the name of the Commercial Hotel. An ice plant is to be added to the equipment of the hotel.

It is stated that the General Council of Louisville will almost certainly adopt ordinances which have been presented providing franchises for the construction of steel viaducts on Water street by the Illinois Central Railroad.

The Merrill-Ruckgaber Company of New York has been given the contract for the construction of the foundations for the new plant of the Kentucky Electric Company, Louisville, which is to be built at a cost of approximately $1,000,000.

The Webster Loose Leaf Filing Company, Louisville, has been incorporated with a capital stock of $85,000 by F. A. Yates, H. W. Davis, and Bradford Davis, Webster. It will make office devices, and has equipped a factory in the Snead Building.

C. Hegewald & Co., New Albany, Ind., are installing a small boiler in the cooperage plant of Joseph Dreidel, in Louisville. They have also secured the contract for the installation of a battery of boilers in the Newmarket Distillery on the Louisville & Nashville Railroad. The company reports that it is actively at work in connection with the installation of steelwork on locks and dams, contracts for which were let by the Government.

A party of Eastern capitalists interested in the Kentucky Securities Company, which is to take over central Kentucky traction properties, visited these last week and outlined plans for improvements which are to be made. Work on these will begin in the immediate future.

The Fiscal Court of Knox County at Barbourville, Ky., has invited bids on the construction of six steel bridges at various points in that county.

Woodworking equipment will be required by the West Kentucky Coal Company at Paducah, Ky., the barge building plant of which was recently burned. W. H. Cunningham is manager.

The Shrode Valve Company has been incorporated at Marion, Ky., by John L. Shrode, F. W. Nunn, T. H. Cochran, C. S. Nunn, and J. W. Blue, Jr., for the manufacture of a patented device. Plans for the erection of a plant have not yet been announced.

J. J. Blocher, owner of the Troy Laundry & Heating Plant, Owensboro, Ky., is in the market for some second-hand power equipment, including two 150-hp. tubular boilers.

The J. H. Hall Plow Company, Maysville, Ky., one of the largest implement concerns in Kentucky, has announced an advance of 25 cents a day in the wages of all of its employees, to take effect at once. Reports from farm implement manufacturers throughout this section indicate a healthy condition of business.

Announcement has been made of the suspension of business by the Maysville Foundry, Maysville, Ky. It has been known for some time that it would probably discontinue operations.

The Coil Coal Company, Madisonville, Ky., is preparing to develop some coal lands, and has let a contract for the sinking of a shaft. The mine will be equipped at once. W. D. Coil is general manager.

Work is being rushed on improvements of the Louisville & Nashville Railroad at Paris, Ky. New repair shops and roundhouses are being built, a steel bridge over Houston Creek is being erected, and a train shed and other buildings involving structural material are going up.

The Louisville & Nashville Railroad will build a concrete and steel bridge over the Bay Fork Creek near Scottsville, Ky. A fill is now being made there preparatory to awarding a contract for the work.

Obion, Tenn., is seeking authority from the State Legislature to issue $40,000 of bonds for a water warks plant.

The Elizabethtown, Milligan & Johnson City Electric Railroad Company has been chartered for the construction of a traction line between the points named in Tennessee. W. G. Payne and others are the incorporators.

F. D. Harvey, 11 South Second street, Memphis, Tenn., is preparing to purchase general contractors' equipment.

Machinery, including power and woodworking, will be purchased by the Champion Lumber Company, Crestmont, Tenn., which will rebuild the sawmill of the Pigeon River Lumber Company, and will increase its capacity to 175,000 ft. a day.

The Tennessee Legislature is considering the appropriation of $20,000 for the construction of a tunnel and the installation of a large electric elevator in the State Capitol Building at Nashville.

The Knox County Court at Knoxville, Tenn., granted a franchise to the East Tennessee Power Company to serve that community with light and power. The company is now building a hydro-electric plant in Polk County, Tennessee.

A bill providing for a bond issue of $25,000 by Dayton, Tenn., for the purpose of providing water works, will be offered in the Tennessee Legislature.

The exact amount of the bond issue which Memphis will probably be authorized to issue for the purpose of constructing an electric light plant is $1,000,000. A bill providing for this has been introduced in the Tennessee Legislature.

The Bureau of Publicity of Memphis, Tenn., reports that during the past year 58 new factories have been established in that city. Most of them, it is stated, are the result of advertising by the community.

B. J. Robinson, Vicksburg, Tenn., is planning the erection of an iron foundry and garage combined at a cost of $20,000. Plans have been drawn and bids for the erection of the building will be asked for shortly.

The DeLoach Mfg. Company, which has been considering several cities as its permanent location, has decided upon Atlanta, Ga. It has completed organization with $250,000 capital stock, and has elected A. A. DeLoach president. The company will make sawmills and motor trucks It had a plant at Bridgeport, Ala.

Several Alabama cities are considering constructing water works systems. These include Greenville, Ashville and Fayette.

Q. D. Sauls, Tylertown, Miss., will erect a saw and planing mill, and is in the market for a gang-saw, rip-saw and planing machines, as well as power equipment.

The United States Engineer Office, Wheeling, W. Va., will open bids April 10 for furnishing and delivering river wall valve jacks, gate engines, gate winches, &c., for dam No. 26, Ohio River.

The American Foundry & Mfg. Company, Frederick, Md., has absorbed the National Shutter Bar Company and leased a factory at West South street, where it will manufacture spring doors, locks and shelf hardware. It will also continue the manufacture of shutter fasteners.

W. D. Haas & Co., Bunkie, La., have begun the work of reconstructing their cotton gin plant which was destroyed by fire last September. The plant that was burned was one of the largest in the South and was valued at $30,000. The new building will be the same size as the one destroyed, but at present not as much machinery will be installed in it.

The Board of Control has signed the contracts for the construction of the sugar mill at Angola, La. Work is to be commenced as soon as possible. The mill will be equipped with the latest types of machinery.

The directors of the Tremont Lumber Company have decided to rebuild their mill at Eros, La., on a larger and bet-

Texas

AUSTIN, TEXAS, April 8, 1911.

In connection with the good road movement that is receiving much support by the different counties of Texas, the construction of many new steel bridges is being considered. Bonds have already been voted for a number of these proposed structures. During the last week general rains have fallen, covering practically all of the State and extending far into Mexico, adding still further to the promising prospects for a good crop season and stimulating business in all lines.

O. P. Slack of Houston and associates are arranging to construct a cotton compress at Harlingen, to cost about $25,000. It is planned to have it finished in time to handle this season's crop.

J. D. Sugg, San Angelo, who recently purchased the electric street railroad system of that city at forced sale to satisfy a mortgage of $28,000, will make extensive improvements to the property, including the construction of new lines.

It is announced by the Trinity Valley Traction Company, Dallas, that it has finished the preliminary work looking to the construction of its proposed interurban electric railroad to run between Dallas and Palestine, about 100 miles, and

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that the work will be started some time during the coming summer. The tie and grading contracts have been let.

The town of Eastland has issued $15,000 of bonds for the purpose of installing a system of water works, including a pumping plant.

At a recent meeting of the Board of Commissioners of Galveston, bids for the construction of a duplicate water main across Galvesten Bay via the new causeway that is being constructed were opened. The lowest bid was that of Isaac Heffron, Galveston, for $66,389. Final action on the bids was deferred. An issue of $100,000 of bonds for this purpose has already been voted on and authorized. The duplicate main is to be 30 in. and approximately 10,766 ft. long.

A. Stattleman, Oklahoma City, Okla., has entered into a contract with the Terminal Stock Yards Company, Houston, for the erection of a fertilizer and rendering plant in the latter city.

The creation of another drainage district in Galveston County is under consideration by the Board of County Commissioners. An election will probably be held some time in May to vote on the proposition of issuing bonds for the purpose. Dredging and ditch machinery will be required to carry out the work if the proposition is favorably acted upon.

The State government of Tamaulipas and the municipal government of Matamoros, Mexico, have granted a concession to A. B. Cole, B. B. Renfro and R. C. Cowan, all of Brownsville, Texas, and Procofio Guerra of Matamoros for the construction of a system of electric railroad from the Mexico terminus of the new international bridge across the Rio Grande to the town of Matamoros, about three miles, and over the principal streets of the latter city. The concession requires that the construction shall be started within 10 months and finished within two years. It is reported that the same men who have obtained this concession contemplate constructing a system of electric street railroad in Brownsville and to extend its track across the bridge to connect with the Mexico system.

A 5-ton ice plant will be installed at Breckenridge by the Breckenridge Mill & Gin Company.

Neils Buck, architect of Chicago, and associates, who recently purchased 1000 acres of land near Beeville, Texas, will install a system of irrigation and colonize the tract.

The San Angelo Milling Company is preparing to begin the construction of a new flour mill at San Angelo, to cost about $30,000.

The Guatemala Coffee Company, Houston, will establish a coffee roasting plant in that city. The roasting apparatus will be of the electric-gas type, and will have a daily capacity of 200 bags of coffee.

An extension of 1½ miles of its track and other improvements will be made to the electric street railroad system of the Marshall Traction Company, Marshall, Texas.

The City Council of Wichita Falls, Texas, has granted a franchise to M. A. Marcus and T. E. Dobson for the installation of an electric light and power plant.

The City Council of Gainesville will soon take steps to extend the distributing system of the water works plant, erect a new standpipe and make other improvements. That city recently voted $150,000 for taking over the water works plant there from the private interests that owned it.

The Gold Bond Company will construct a large system of irrigation near Pecos.

It is authoritatively announced that Stone & Webster, Boston, Mass., will begin the construction of an interurban electric railroad from Dallas to Waxahachie, 30 miles, within 30 days after the deeds to the right of way have been signed and the franchise for the use of the streets of Waxahachie has been granted. The work of constructing the line is to be finished within 12 months after it is started. The Southern Traction Company, Dallas, is also negotiating with the City Council of Waxahachie for the use of certain streets for the proposed line that it is to construct to and through that place.

A cotton gin will be installed at Atwell by the Elmen Realty Company, Houston.

The San Saba Quarry Company will install machinery at its marble quarries near San Saba, for the purpose of cutting and hoisting the stone. W. L. Sweeney of San Saba is president of the company.

I. A. Walker of Dallas has applied to the City Council of Temple for a franchise for the installation of a gas plant and distributing system. Another application for a similar franchise is pending before the City Council.

Fred Lotz and associates are erecting a lumber mill and planer at Anuhuac.

The plan that was recently set on foot to organize a private company to develop and put into effect the hydro-electric feature of the Elephant Butte dam and land reclamation project at Elephant Butte, N. M., has been abandoned on the recommendation of a majority of the Board of Governors of the Elephant Butte Water Users' Association and the El Paso Valley Water Users' Association. The Federal Government is preparing to install a temporary electric power plant at the site of the big dam. It will cost about $500,000. O. H. Ensign, chief electrical engineer of the reclamation service, is in charge of this branch of the project.

Active steps have been taken by the Commercial Club of Belton to have an interurban electric railroad constructed between that town and Holland, 16 miles.

The Old Dominion Copper Company will install an extensive system of underground electric railroad in its mines in the Globe district of Arizona.

A committee of citizens of Wilcox, Ariz., consisting of H. A. Morgan and others, is promoting the installation of a large central electric power plant and transmission lines to various points in the Sulphur Spring Valley, the power to be operated chiefly for the operation of irrigation pumping plants.

Edward Beggs recently bonded two of his placer mining claims in the La Pax district, Arizona, to a syndicate of Eastern men, and the latter will install a large hydraulic plant for working the property.

The Elephant Head Buttes Mining Company has under consideration plans for a concentrating and separating plant for its mine, situated 35 miles south of Tucson, Ariz.

George W. Stine, Cananea, Mexico, will install a complete hoisting equipment, air compressor, drills and pumpinng plant at his mine in the Cananea district.

The Twin Peaks Mining Company contemplates installing an ore reduction mill at its mine near Steeple Rock, N. M.

The Economic Mining & Milling Company will install considerable new machinery at its mine in the Carrizozo district, N. M.

Propositions have been received by the Commercial Club of San Antonio from the Geo. D. Mayo Machine Company, Laconia, N. H., to establish a knit goods factory, and from H. L. Breinig to establish a furniture factory.

W. T. Watt, president of the Provident National Bank, Waco, is arranging preliminaries for the new sanitarium to be built at a cost of $300,000. The structure will be 14 stories, of steel, brick and terra cotta.

Eastern Canada

TORONTO, ONT., April 8, 1911.

Trade conditions continue to favor larger business in all lines involving the use of plant and machinery. On all hands maintenance of the present activity at least seems assured, and the prospects for quite a marked expansion beyond the limits of last season's trade are shading into realities. In some departments the business in hand already exceeds that of last year, and the best is yet to come. The volume and economic quality of the wave of immigration now rolling in are promising in the way of additional buying power, and the influx of investment capital keeps pace with the stream of population from other countries. There is scarcely any part of Canada in which enterprise is not creating new wealth-producing or wealth-distributing works and creating new needs to be satisfied. No one who sees newspapers published at the principal centers of the several Provinces can fail to be impressed with the large number of items dealing with new projects for the establishment of industries and for the construction of great plants and important railroads. Apparently the hesitation caused by the reciprocity agreement has passed away so far as developments of this kind are concerned. In some fields, notably in lumber manufacture, it would appear that the proposed agreement has given an impulse to the movement of American capital into Canada. Assuredly the agreement has been an influence to immigration from the United States.

The chairman of the Ontario Hydro-Electric Power Commission has announced that arrangements have been made with the New York and Ontario Power Company of Waddington, N. Y., for the delivery of 15,000 hp. within 18 months for the supplying of towns and cities in Western Ontario by the commission. A further supply of 20,000 hp. is also to be at the service of the commission from High Falls on the Madawaska for distribution in the same area. The towns and cities in that part of the Province have been for some time calling for service by the commission, and there is now a practical certainty that the commission will build an extensive transmission system there like that it has radiating from Niagara Falls among towns and cities in lower western Ontario. There will be three main stations—one at Brockville, one at Morrisburg and one at Kingston. From each of these wires will ramify 20 miles and upward.

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Concrete Mixer.—Svenson-Shuman Machine Company, Bessemer Building, Pittsburgh, Pa. Circular. Illustrations and descriptive matter explain the operation of the Svenson measuring batch mixer, which is designed especially for buildings, foundations, floors, sidewalks, cement blocks, mortar mixing and curb and gutter work. Among the special features of the mixer are that each batch is measured while the preceding one is being mixed, the mixing is done by plows in a stationary tub and in plain sight of the operator, the mixture is discharged from the bottom of the mixing vessel and the batch can be dumped at the end a little at a time or all at once, as may be desired.

Special Machinery and Appliances.—C. E. Sargent, Marine Building, Chicago, Ill. Pamphlet. Illustrates a large number of special machines and appliances which have been designed to solve mechanical problems, reduce the cost of manufacture and accomplish work formerly done by hand.

Raw Hide Pinions.—The New Process Raw Hide Company, Syracuse, N. Y. Mailing card. Pertains to the line of New Process noiseless pinions for direct drive. These pinions are said to have the breaking strength and wearing qualities of metal with the noise and shock incident to the use of metal to metal gearing eliminated.

Power Plant Instruments.—Louis M. Ellison, 6328 Princeton avenue, Chicago, Ill. Pamphlet. Concerned with a line of instruments for power plant work which he has designed and manufactured. These include draft gauges of the standardizing and differential types and accessories, including brackets, thermometers, portable piping, reducer sets for piping and wire goose necks. Direct pressure and draft gauges are also shown, as well as protable balanced draft gauges and a throttling-evaporating calorimeter.

Lifting Magnets.—The Browning Engineering Company, Cleveland, Ohio. Mailing card. Shows a number of uses of the Browning magnets for handling metal in connection with a locomotive crane and an overhead traveling crane.

Hoists, Trolleys and Cranes.—Climax Hoist Company, 1753 North Howard street, Philadelphia, Pa. Catalogue C. Size, 3½ x 6½ in.; pages, 32. Shows a line of spur geared hoists, plain and geared trolleys and cranes. The various appliances are illustrated and described, and there are a number of sectional views showing constructional details. A number of illustrations of installations and a complete price-list are included. An illustrated description of one of the hoists appeared in *The Iron Age* April 6, 1911.

Oxhydric Metal Cutting and Welding.—The American Oxhydric Company, Milwaukee, Wis. Pamphlet. Refers to the use of the Oxhydric process for the cutting and the welding of metals, and shows some of the work that has been done, as well as the tools employed.

Grab Bucket.—Pawling & Harnischfeger Company, Milwaukee, Wis. Folder. Points out the advantages of using a single rope grab bucket for handling sand in foundries.

Copper Clad Wire.—Duplex Metals Company, Chester, Pa. Pamphlet entitled "The Copper Clad Handbook." Concerned with the copper clad wire which this company manufactures. After a brief historical introduction and a short description of the process of manufacture, the various types of wire are taken up together with some of their applications. Tables giving the weights and dimensions of the different sizes of wire made complete the pamphlet.

Recording Voltmeters.—The Bristol Company, Waterbury, Conn. Bulletin No. 131. Refers to the use of Bristol's recording voltmeters for switchboard and portable service with 12, 8 and 6 in. charts. The several types of instruments made are illustrated, and reproductions of the various kinds of charts which can be supplied for either alternating or direct current for a wide range of voltages and different periods of time are included. Dimensions of both the alternating and the direct current instruments are given, and a partial list of users completes the bulletin.

Slide Rule.—George W. Richardson, 4212 Twenty-fourth place, Chicago, Ill. Circular. Refers to the use of a direct reading slide rule for solving a great variety of problems. The special feature of this rule is that a number of key letters are stamped on the slide and show through a hole in the body of the rule. In use after the problem to be solved has been selected, the key letter corresponding to its class is noted and the slide moved either to the right or the left until this letter appears in the key hole. When this has been done the answer to the problem will be given directly without any further manipulation of the rule. The stock of the rule is made of aluminum with reinforcing ribs and the scales are celuloid with ivory finish.

Drill Chucks.—The Jacobs Mfg. Company, Hartford, Conn. Catalogue. Size, 6 x 9 in.; pages, 34. Gives a brief description of the special features of the Jacobs improved drill chuck followed by illustrations showing the actual sizes of the chucks and a brief statement of the capacity, dimensions, &c. Sectional views of the chucks together with directions for taking them apart, an illustrated list of straight and taper shanks furnished and a price-list of repair parts are included.

Babbitt Ladle.—Wolverine Machine Works, Saginaw, Mich. Circular. Concerned with the Gondola babbitt ladle which has a sliding wooden handle for use in pouring. The shape of the lips enables either a small or a large stream to be poured, while the sides which are high just back of this point prevent the metal from backing up and running over. The parts exposed to the fire are of cast iron, and the shape gives balance to the ladle and accuracy to the pour. Three sizes, ranging in capacity from 15 to 40 lb., are made.

Ice Making and Refrigerating Machinery.—The Cleveland Ice Machine Company, Cleveland, Ohio. Catalogue. Size, 6½ x 9½ in.; pages, 40. Lists the various types of machines built by the company and describes and illustrates their special features. In addition to the machines, space is given to accessories such as electric motors and gas engines for driving them, ammonia condensers and coils, ice cans, gauges and pipe fittings.

Rotary Converters.—Westinghouse Electric & Mfg. Company, Pittsburgh, Pa. Circular No. 1028. Describes completely a new line of self-starting rotary converters. The combined efficiency of one of these converters and the transformers used for stepping down the voltage of the transmission line is generally higher at all loads than that of a motor-generator set of equal capacity and voltage. In addition to this increase in efficiency, the simplicity and compactness of the rotary converter has led to its use where alternating current has to be converted to direct current for railway or power service. This new line of converters is built in all sizes from small machines used in the laboratory for demonstration purposes up to units having a capacity of 3000 kw. The illustrations show the machines assembled, as well as their several parts, a number of installations and diagrams of typical rotary substations.

Duplicating Machine.—Copygraph Mfg. Company, Ambridge, Pa. Pamphlet. Refers to the use of the Dailey American Copygraph for producing manifold fac-simile copies of a typewritten letter, postal or index card or any other form. The special advantages of the Copygraph are that the chase holding the type matter can be placed in position or removed from the machine without touching or altering the position of the ribbon, a copy is printed with every movement of the roller or about 2000 per hour, gravity paper feed, automatic removal of the printed sheets and a minimum number of moving parts.

Iron and Steel Cements.—Smooth-On Mfg. Company, 572 Communipaw avenue, Jersey City, N. J. Booklet. Size, 3¼ x 6 in.; pages, 16. Contains extracts from the Smooth-On instruction book and shows the various products of this company for repairing breaks in pipes, remedying defects in castings and making joints in structural iron or steel work. A number of repairs made with these products are illustrated, as well as the application of the cements.

Metals and Alloys.—The Electric Smelting & Aluminum Company, Lockport, N. Y. Brochure. Lists the various alloys of aluminum, silicon, manganese and other metals which this company manufactures in ingot form in the electric furnace. Brief specifications are given for the different metals, which include pure aluminum, nickel aluminum, aluminum bronze, silicon copper, manganese copper, phosphor tin and copper and several grades of babbitt metal.

Head Trimming Press.—The Waterbury Farrel Foundry & Machine Company, Waterbury, Conn. Circular No. 300 A. Gives general descriptions and specifications for a line of semi-automatic bolt head trimming presses for trimming hot forged bolts. Three different sizes of press are built, all of which are illustrated, together with views of the bolts before and after they have gone through the press. An illustrated description of one of these presses appeared in *The Iron Age* January 12, 1905.

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Paints for Structural Steel Work.—Schoellkopf, Hartford & Hanna Company, 30 Church street, New York city. Folder. Relates to the Steelkote paints for structural work, which are said to combine the qualities of decoration and protection. The paints are made in seven colors and chips show the exact shades.

Automatic Alarm.—American Safety Lamp & Mine Supply Company, Scranton, Pa. Circular, Bulletin No. 8. Deals with the American automatic trip alarm, which is designed to warn people against crossing the tracks when a trip of cars being pushed by a locomotive or pulled by a rope is approaching. The essential parts of the alarm are two in number, a light in which a special spring arrangement prevents the wick from jarring down into the oil fount, and a 10-in. bell which is operated by the vibration of the car. The device is suspended from the front end or side of the leading car, and it is claimed that the bell can be heard distinctly from 300 to 500 ft. ahead of an approaching trip of cars.

Concrete Mixer.—Svenson-Shuman Machine Company, Bessemer Building, Pittsburgh, Pa. Circular. Illustrations and descriptive matter explain the operation of the Svenson measuring batch mixer, which is designed especially for buildings, foundations, floors, sidewalks, cement blocks, mortar mixing and curb and gutter work. Among the special features of the mixer are that each batch is measured while the preceding one is being mixed, the mixing is done by plows in a stationary tub and in plain sight of the operator, the mixture is discharged from the bottom of the mixing vessel and the batch can be dumped at the end a little at a time or all at once, as may be desired.

Special Machinery and Appliances.—C. E. Sargent, Marine Building, Chicago, Ill. Pamphlet. Illustrates a large number of special machines and appliances which have been designed to solve mechanical problems, reduce the cost of manufacture and accomplish work formerly done by hand.

Raw Hide Pinions.—The New Process Raw Hide Company, Syracuse, N. Y. Mailing card. Pertains to the line of New Process noiseless pinions for direct drive. These pinions are said to have the breaking strength and wearing qualities of metal with the noise and shock incident to the use of metal to metal gearing eliminated.

Power Plant Instruments.—Louis M. Ellison, 6328 Princeton avenue, Chicago, Ill. Pamphlet. Concerned with a line of instruments for power plant work which he has designed and manufactured. These include draft gauges of the standardizing and differential types and accessories, including brackets, thermometers, portable piping, reducer sets for piping and wire goose necks. Direct pressure and draft gauges are also shown, as well as protable balanced draft gauges and a throttling-evaporating calorimeter.

Lifting Magnets.—The Browning Engineering Company, Cleveland, Ohio. Mailing card. Shows a number of uses of the Browning magnets for handling metal in connection with a locomotive crane and an overhead traveling crane.

Hoists, Trolleys and Cranes.—Climax Hoist Company, 1753 North Howard street, Philadelphia, Pa. Catalogue C. Size, 3½ x 6½ in.; pages, 32. Shows a line of spur geared hoists, plain and geared trolleys and cranes. The various appliances are illustrated and described, and there are a number of sectional views showing constructional details. A number of illustrations of installations and a complete price-list are included. An illustrated description of one of the hoists appeared in *The Iron Age* April 6, 1911.

Oxhydric Metal Cutting and Welding.—The American Oxhydric Company, Milwaukee, Wis. Pamphlet. Refers to the use of the Oxhydric process for the cutting and the welding of metals, and shows some of the work that has been done, as well as the tools employed.

Grab Bucket.—Pawling & Harnischfeger Company, Milwaukee, Wis. Folder. Points out the advantages of using a single rope grab bucket for handling sand in foundries.

Copper Clad Wire.—Duplex Metals Company, Chester, Pa. Pamphlet entitled "The Copper Clad Handbook." Concerned with the copper clad wire which this company manufactures. After a brief historical introduction and a short description of the process of manufacture, the various types of wire are taken up together with some of their applications. Tables giving the weights and dimensions of the different sizes of wire made complete the pamphlet.

Recording Voltmeters.—The Bristol Company, Waterbury, Conn. Bulletin No. 131. Refers to the use of Bristol's recording voltmeters for switchboard and portable service with 12, 8 and 6 in. charts. The several types of instruments made are illustrated, and reproductions of the various kinds of charts which can be supplied for either alternating or direct current for a wide range of voltages and different periods of time are included. Dimensions of both the alternating and the direct current instruments are given, and a partial list of users completes the bulletin.

Slide Rule.—George W. Richardson, 4212 Twenty-fourth place, Chicago, Ill. Circular. Refers to the use of a direct reading slide rule for solving a great variety of problems. The special feature of this rule is that a number of key letters are stamped on the slide and show through a hole in the body of the rule. In use after the problem to be solved has been selected, the key letter corresponding to its class is noted and the slide moved either to the right or the left until this letter appears in the key hole. When this has been done the answer to the problem will be given directly without any further manipulation of the rule. The stock of the rule is made of aluminum with reinforcing ribs and the scales are celuloid with ivory finish.

Drill Chucks.—The Jacobs Mfg. Company, Hartford, Conn. Catalogue. Size, 6 x 9 in.; pages, 34. Gives a brief description of the special features of the Jacobs improved drill chuck followed by illustrations showing the actual sizes of the chucks and a brief statement of the capacity, dimensions, &c. Sectional views of the chucks together with directions for taking them apart, an illustrated list of straight and taper shanks furnished and a price-list of repair parts are included.

Babbitt Ladle.—Wolverine Machine Works, Saginaw, Mich. Circular. Concerned with the Gondola babbitt ladle which has a sliding wooden handle for use in pouring. The shape of the lips enables either a small or a large stream to be poured, while the sides which are high just back of this point prevent the metal from backing up and running over. The parts exposed to the fire are of cast iron, and the shape gives balance to the ladle and accuracy to the pour. Three sizes, ranging in capacity from 15 to 40 lb., are made.

Ice Making and Refrigerating Machinery.—The Cleveland Ice Machine Company, Cleveland, Ohio. Catalogue. Size, 6½ x 9½ in.; pages, 40. Lists the various types of machines built by the company and describes and illustrates their special features. In addition to the machines, space is given to accessories such as electric motors and gas engines for driving them, ammonia condensers and coils, ice cans, gauges and pipe fittings.

Rotary Converters.—Westinghouse Electric & Mfg. Company, Pittsburgh, Pa. Circular No. 1028. Describes completely a new line of self-starting rotary converters. The combined efficiency of one of these converters and the transformers used for stepping down the voltage of the transmission line is generally higher at all loads than that of a motor-generator set of equal capacity and voltage. In addition to this increase in efficiency, the simplicity and compactness of the rotary converter has led to its use where alternating current has to be converted to direct current for railway or power service. This new line of converters is built in all sizes from small machines used in the laboratory for demonstration purposes up to units having a capacity of 3000 kw. The illustrations show the machines assembled, as well as their several parts, a number of installations and diagrams of typical rotary substations.

Duplicating Machine.—Copygraph Mfg. Company, Ambridge, Pa. Pamphlet. Refers to the use of the Dailey American Copygraph for producing manifold fac-simile copies of a typewritten letter, postal or index card or any other form. The special advantages of the Copygraph are that the chase holding the type matter can be placed in position or removed from the machine without touching or altering the position of the ribbon, a copy is printed with every movement of the roller or about 2000 per hour, gravity paper feed, automatic removal of the printed sheets and a minimum number of moving parts.

Iron and Steel Cements.—Smooth-On Mfg. Company, 572 Communipaw avenue, Jersey City, N. J. Booklet. Size, 3¼ x 6 in.; pages, 16. Contains extracts from the Smooth-On instruction book and shows the various products of this company for repairing breaks in pipes, remedying defects in castings and making joints in structural iron or steel work. A number of repairs made with these products are illustrated, as well as the application of the cements.

Metals and Alloys.—The Electric Smelting & Aluminum Company, Lockport, N. Y. Brochure. Lists the various alloys of aluminum, silicon, manganese and other metals which this company manufactures in ingot form in the electric furnace. Brief specifications are given for the different metals, which include pure aluminum, nickel aluminum, aluminum bronze, silicon copper, manganese copper, phosphor tin and copper and several grades of babbitt metal.

Head Trimming Press.—The Waterbury Farrel Foundry & Machine Company, Waterbury, Conn. Circular No. 300 A. Gives general descriptions and specifications for a line of semi-automatic bolt head trimming presses for trimming hot forged bolts. Three different sizes of press are built, all of which are illustrated, together with views of the bolts before and after they have gone through the press. An illustrated description of one of these presses appeared in *The Iron Age* January 12, 1905.

CURRENT METAL PRICES.

The following quotations are for small lots, New York. Wholesale prices, at which large lots only can be bought, are given elsewhere in our weekly market report.

IRON AND STEEL—

Bar Iron from store—

Refined Iron:

1 to 1¼ in. round and square; 1½ to 4 in. x ⅜ to 1 in.	₩ lb 1.75¢
1½ to 4 in. x ¼ to 5-1	₩ lb 1.85¢
Rods—⅜ and 11-16 round and square	₩ lb 1.85¢

Angles:	Cts ₩ lb
3 in. x ¼ in. and larger	2.00¢
3 in. x 3-16 in. and ⅛ in.	2.25¢
1½ to 2½ in. x ⅛ in.	2.10¢
1½ to 2¾ in. x 3-16 in. and thicker	2.00¢
1 to 1¾ in. x 3-16 in.	2.10¢
1 to 1¾ x ⅛ in.	2.20¢
⅞ x ⅛ in.	2.30¢
¾ x ¼ in.	2.40¢
⅝ x ¼ in.	3.45¢
½ x 3-32 in.	4.25¢

Tees:

1 in.	2.65¢
1¼ in.	2.45¢
1½ to 2½ x ¼ in.	2.15¢
1½ to 2½ x 3-16 in.	2.35¢
3 in. and larger	2.05¢
Beams	2.00¢
Channels, 3 in. and larger	2.00¢
Bands—1½ to 6 x 3-16 to No. 8	2.30¢
"Burden's Best" Iron, base price	3.15¢
Burden's "H. B. & S." Iron, base price	2.95¢
Norway Bars	3.00¢

Merchant Steel from Store—

	per lb
Bessemer Machinery	1.90¢
Toe Calk, Tire and Sleigh Shoe	2.50@3.00¢
Best Cast Steel, base price in small lots	7¢

Sheets from Store—

Black

	One Pass, C. R Soft Steel.	R. G. Cleaned.
No. 16	₩ lb 2.55¢	2.80¢
Nos. 18 to 20	₩ lb 2.70¢	2.90¢
Nos. 22 and 24	₩ lb 2.75¢	3.00¢
No. 26	₩ lb 2.80¢	3.10¢
No. 28	₩ lb 2.95¢	3.30¢

Russia, Planished, &c.

Genuine Russia, according to assortment	₩ lb 12 @14½
Patent Planished, W. Dewees Wood	₩ lb A, 10¢; B, 9¢ net.

Galvanized.

Nos. 12 and 14	₩ lb 2.95¢
Nos. 22 to 24	₩ lb 3.30¢
No. 26	₩ lb 3.50¢
No. 28	₩ lb 3.80¢

No. 20 and lighter 36 inches wide, 25¢ higher

Genuine Iron Sheets—

Galvanized.

Nos. 22 and 24	₩ lb 5.75¢
No. 26	₩ lb 6.25¢
No. 28	₩ lb 7.25¢

Corrugated Roofing—

2½ in. corrugated.	Painted	Galvd
No. 24	₩ 100 sq. ft. $3.85	4.80
No. 26	₩ 100 sq. ft. 2.95	4.00
No. 28	₩ 100 sq. ft. 2.60	3.75

Tin Plates—

American Charcoal Plates (per box.)

"A.A.A." Charcoal:	
IC, 14 x 20	$6.65
IX, 14 x 20	7.90
A. Charcoal:	
IC, 14 x 20	$5.60
IX, 14 x 20	5.70

American Coke Plates—Bessemer—

IC, 14 x 20 ..107 lb	$4.50
IX, 14 x 20	5 50

American Terne Plates—

IC, 20 x 28 with an 8 lb. coating	$8.70
IX, 20 x 28 with an 8 lb coating	10.70

Seamless Brass Tubes—

List November 13, 1908. Base price 18¢

Brass Tubes, Iron Pipe Sizes—

List November 13, 1908. Base price 18¢

Copper Tubes—

List November 13, 1908. Base price 21¢

Brazed Brass Tubes—

List February 1, 1911. 19½¢ ₩ lb

High Brass Rods—

List February 1, 1911. 14¼¢ ₩ lb

Roll and Sheet Brass—

List February 1, 1911. 14¼¢ ₩ lb

Brass Wire—

List February 1, 1911. 14¼¢ ₩ lb

Copper Wire—

Base Price. Carload lots mill 13¾¢

Copper Sheets—

Sheet Copper Hot Rolled, 16 oz (quantity lots) ₩ lb 18 ¢
Sheet Copper Cold Rolled, 1¢ ₩ lb advance over Hot Rolled.
Sheet Copper Polished 20 in. wide and under, 1¢ ₩ square foot
Sheet Copper Polished over 20 in. wide, 2¢ ₩ square foot.
Planished Copper, 1¢ ₩ square foot more than Polished.

METALS—

Tin—

Straits Pig	₩ lb 45 @46 ¢

Copper—

Lake Ingot	₩ lb 14½@15 ¢
Electrolytic	₩ lb 14 @14½ ¢
Casting	₩ lb 14 @14½ ¢

Spelter—

Western	₩ lb 6¼@6½ ¢

Zinc.

No 9, base, casks	₩ lb 8 ¢ | Open ₩ lb 8½ ¢

Lead.

American Pig	₩ lb 5 @5½ ¢
Bar	₩ lb 6½@6¾ ¢

Solder.

½ & ½, guaranteed	₩ lb 28 @28½ ¢
No. 1	₩ lb 26 @26½ ¢
Refined	₩ lb 23½@24 ¢

Prices of Solder indicated by private brand vary according to composition.

Antimony—

Cookson	₩ lb @10½ ¢
Hallett's	@10½ ¢
Other Brands	@9½ ¢

Bismuth—

Per lb $2.00@$2.25

Aluminum—

No. 1 Aluminum (guaranteed over 99% pure), in ingots for remelting	33¢
Rods & Wire	Base Price 31¢
Sheets	Base Price 33¢

Old Metals.

Dealers' Purchasing Prices Paid in New York

	Cents
Copper, Heavy cut and crucible	₩ lb 10.75@11.00
Copper, Heavy and Wire	₩ lb 10.50@10.75
Copper, Light and Bottoms	₩ lb 9.50@ 9.75
Brass, Heavy	₩ lb 7.00@ 7.25
Brass, Light	₩ lb 6.50@ 6.75
Heavy Mechine Composition	₩ lb 9.25@ 9.50
Clean Brass Turnings	₩ lb 7.00@ 7.25
Composition Turnings	₩ lb 8.25@ 8.50
Lead, Heavy	₩ lb .....@ 3.75
Lead, Tea	₩ lb .....@ 3.50
Zinc Scrap	₩ lb .....@ 4.00

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